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ON THE USE OF PETROLEUM BENZIN IN PHARMACY.

BY L. WOLFF.

(*Read at the Pharmaceutical Meeting, December 19.*)

Petroleum benzin has been frequently proposed and variously experimented with by different operators, with the view of substituting the much higher priced ether in preparing oleoresins, and has been repeatedly found to not answer the purpose intended for it. ("A. J. Ph.," 1872, page 208). Although its valuable solvent powers for fatty matter, wax and essential oils cannot be disputed, it fails to extract the resins and the active ingredients, which are of the utmost importance in oleoresins. Ginger treated with benzin yields an oil containing all the odoriferous properties thereof, but extracting none of the pungent-tasting resin for the remedial properties of which it is justly celebrated, and which subsequent to the benzin process is readily dissolved from it by ether or alcohol. Buchu under a like treatment, as reported by another contributor of this journal on this subject, gives an oily substance devoid of the diuretic properties of the leaves, though possessing their specific odor. Cubebs, though completely exhausted by it of its fixed and essential oils, fails to yield its cubebic acid to it, black pepper its piperin, and wormseed its resin and santonin; but all of the mentioned substances, and many more which have been subjected to the same process, are readily deprived of their fixed and essential oils, leaving them inodorous, seemingly dry and incoherent, powders, that are, if treated with alcohol, ether or chloroform, readily deprived of their resins, thus affording a method for obtaining them separate from wax, fixed and essential oils.

Its extraordinary solvency for essential oils destines benzin for an important place in pharmacy, and oils derived by its aid from cinnamon, cloves and other drugs are, if their odor is any indication of

their value, if not superior, certainly not inferior to the distilled oils of these articles.

The oils obtained by exhaustion with benzin and its subsequent evaporation are mixed with wax and fixed oils to some extent, which can easily be separated therefrom by dissolving in alcohol, in which the latter are insoluble, filtration of this solution, and either expulsion of the alcohol by evaporation at the moderate heat of a water-bath or, much safer and better, by mixing the filtered alcoholic solution with several times its bulk of water, when the essential oil will arise to the surface or subside beneath it, as its specific gravity may be.

The oils by this cold process have a beautiful aroma, superior to many of the distilled ones, and the easy manner of obtaining them may, without doubt, prove a valuable method for the pharmacist who cannot always procure in the market the oils he wants, and has no facilities for distilling them, besides giving him fair means to arrive at a quantitative estimate of the essential oil contained in an article under analysis.

The essential oil of parsley seed cannot thus be separately prepared by the aid of benzin, as it contains another peculiar oily substance, well known by the name of "apiol," which is soluble both in it and also alcohol.

A great deal of the apiol in the market, both in bulk and in capsules, is nothing more than an oleoresin of parsley seed, which can lay no claim whatever to its name, being of green color, insoluble, to a large extent, in alcohol, and congealing at ordinary winter temperature, all of which properties "true apiol" does not possess. Apiol has come into extensive use of late years, secured high praise as an emmenagogue, and is also claimed by its discoverers to be an antiperiodic but little, if any, inferior to quinia; but its high price, consequent to the expensive process as proposed by Messrs. Joret & Homolle, perhaps more than anything else, prevents its general introduction.

Powdered parsley seed, exhausted with benzin, and the liquid spontaneously evaporated, yields a mixture containing principally fixed oil, wax and apiol; the latter, alone, being soluble in alcohol, can readily be recovered therefrom by repeated washings in stronger alcohol. The washings evaporated over the water-bath with a gentle heat, leave as residue "True Apiol," corresponding in every respect with the article

sold under the name of "Joret & Homolle's," having the advantage of its low price making it accessible to persons of limited means, as well as to the more favored by fortune, especially if it is not dispensed in capsules, for which there is no occasion, since it may be given dissolved in essence of peppermint, or in emulsion, disguised by the oil of the same name. Samples of "Apiol" prepared in this manner, have been tried by several prominent physicians, in their practice, and were pronounced to be equally as efficient as the imported French article.

Quite frequently the fixed oils much encumber the result of pharmaceutical operations, as is prominently the case in preparing the "Alcoholic Extract of Nux Vomica," which has often been noticed and given attention to by many writers. (See "A. J. Ph.," 1874, page 405; also, Prof. Procter on the same.) Nux vomica, if exhausted with benzin, yields a large percentage of a clear fixed oil, congealing at ordinary winter temperature, and the powder, if subsequently treated in the usual manner with stronger alcohol, gives an extract which offers no trouble by proper evaporation in reducing it to the dry state. The oil derived from the benzin exhaust, to make sure of not losing any strychnia or brucia that may be contained therein, should be repeatedly shaken with dilute alcohol until the washings fail to betray to the palate the specific bitter taste of their alkaloids; then the washings must be mixed with the extract in course of evaporation, and the whole reduced to proper consistency. By the ordinary way, the separation of the oil from the extract is at best a tedious matter, causing the loss of extract, and is never completely performed, thus preventing evaporation to dryness, which by the benzin process is readily effected.

Another article, which the pharmacist has frequently to purchase at an exorbitant price, is "Purified Oleic Acid," which has been much used of late in making the oleates now in use, and can be easily and at small expense prepared with benzin as solvent, in the following way:

Oil of sweet almonds, saponified with caustic potash and the soap decomposed with tartaric acid, is washed with hot water to separate the precipitated bitartrate of potassium from the mixture of oleic and palmitic acids. These are combined with litharge forming the oleomargarate of lead, from which the benzin dissolves the oleate of lead, leaving as residue the undissolved palmitate thereof. From the benzin solution the lead is precipitated by dilute hydrochloric acid, in form of chloride of lead, and on evaporation of the benzin, "Oleic Acid"

will remain sufficiently pure for pharmaceutical purposes, giving clear and permanent solutions with the red and yellow mercurial oxides, as high as thirty per cent. if necessary.

As crude commercial oleic acid can be bought at very low figures, it may be purified by combining it with litharge, deriving from it the oleate of lead, from which again, by the aid of benzin, the purified oleate can be separated, and as before stated, purified oleic acid prepared at but a small expense.

To gain the same end, the simplest way perhaps is to utilize the ready-made oleo-palmitate of lead, the officinal leadplaster, dissolve it in benzin and extract from it the oleic acid by precipitating the lead by aid of hydrochloric acid.

Oleic acid thus prepared has been used for some time, and found to answer better for the preparation of the oleates than the article sold by some of the manufacturing chemists.

The above results by no means limit the utility of petroleum benzin as a solvent and important pharmaceutical factor, but they will show that this refuse article, of comparative little commercial value, which has been applied to but little more than the removal of oil, grease or paint stains, may be turned to good account by its very deficiency to act like ether or similar substances as a general solvent for both fats and resins.

Philadelphia, Dec. 1st, 1876.

PRACTICAL NOTES.

(Extracted from theses presented to the Philadelphia College of Pharmacy in 1876.)

Aquæ Medicatæ.—Wm. Wesley Trout has examined the various methods proposed for the preparation of medicated waters, and gives the preference to those prepared by distillation. When this process is not practicable, the "hot water process" is considered the best, as yielding a pure and strong water. Very acceptable waters may be obtained by the use of the elæosacchara of the European pharmacopœias, which, for this purpose, the author proposes to prepare by using 15 minims of the oil to three drachms of sugar, triturating them together and then adding one pint of distilled water gradually, with constant trituration. Using paper pulp for dividing the volatile oils, the author obtained the weakest waters [probably because too much

paper pulp was used.—EDITOR]. Purified animal charcoal, used with the oil, also yields good waters.

Walter Theron Baker has principally operated with cinnamon and camphor water, and prefers, particularly for the latter, well-burned granulated wood charcoal; the kind used having been obtained from Jersey pine. 3iss of the charcoal to 3i camphor was found to be sufficient.

Preservation of Syrups.—Allen Spengler has found that a little salicylic acid [how much?] added to syrupus scillæ comp. would preserve it for months, while portions of the same syrup, kept under the same conditions, except that no salicylic acid had been added, were completely spoiled.

Syrup of Ipecacuanha.—In preparing this syrup Wm. H. Righter, Jr., aims first at obtaining a fluid extract which will mix with syrup without producing a precipitate, which is effected by diluting the officinal fluid extract with water, filtering and evaporating to the proper measure. By adding one fluidounce of this purified fluid extract to three fluidounces of syrup of tolu and then twelve fluidounces of simple syrup, an efficient syrup of ipecac is obtained, which has a pleasant flavor and is not prone to fermentation.

Syrup of Wild Cherry Bark, possessing a deep brown-red color and a strong odor of hydrocyanic acid, is obtained, according to John Ritter, by first moistening the five troyounces of powdered wild cherry bark with a mixture of two fluidounces of glycerin and one-half a fluidounce of distilled water, allowing it to stand in a closed vessel for 24 hours and then proceeding according to the directions of the "Pharmacopœia."

Variation in Fluid Extracts.—Clayton K. Smith has made some comparative experiments in relation to fluid extracts, by evaporating four ounces with a gentle heat to a pilular consistence, and weighing this residue. Whether, and in what manner the amount of glycerin or sugar was determined, is not stated. The results cannot be claimed as possessing any analytical value, but they illustrate very forcibly the variation of commercial fluid extracts. Nos. 1, 2 and 3 in the following table were from three manufacturers in New York; Nos. 4, 5 and 6, from three Philadelphia houses. The extracts yielded by four [fluid?] ounces weighed as follows:

	1	2	3	4	5	6
Extractum Gentianæ fluidum,	360 grs.	800 grs.	1070 grs.	720 grs.	1440 grs.	850 grs.
“ sennæ	“ 840	“ 1010	“ 720	“ 540	“ 1380	“ 825
“ rhei	“ 480	“ 1235	“ 1210	“ 960	“ 1500	“ 800
“ scillæ	“ 1000	“ 1068	“ 1300	“ 800	“ 1680	“ 1080
“ ergotæ	“ 480	“ 420	“ 550	“ 480	“ 780	“ 780

Solubility of Drugs.—Philip J. Laver has determined the amount of moisture in the following air-dried powdered drugs by keeping them in an air-bath at a temperature of 110° F. until they ceased to lose weight; those containing volatile oil were dried over lime in an air-tight box. The amount of soluble matter was ascertained by percolating 960 grains of the air-dry drugs with the menstrua directed by the “U. S. Pharmacopœia,” using sufficient quantities for preparing the official tinctures; the residues were afterwards dried as before, and the difference in weight, after deducting the previously ascertained amount of moisture, was regarded as the weight of the soluble matter contained in the tincture. In this manner the following figures were obtained:

960 grs. of airdry	Ginger,	Valerian,	Lobelia,	Calumba,	Sanguinaria,	Cinchona,	Arnica,	Digitalis,	Krameria,
Lost in drying,	40	100	74	102	106	100	98	72	60 grs.
Yielded solu- ble matter,	55	139	146	151	213	154	192	328	440 “
Or pr. fluid oz.	6½	8 11⁄16	9½	9 7⁄16	13 5⁄16	14 1⁄16	18	20½	27½ “

Tinctura Cinchonæ Comp.—Wm. D. Robinson has examined a number of specimens of this tincture, which had been obtained from various sources. After some preliminary experiments, Winkler's process was decided upon, and 5 fluidounces and 100 minims of the tincture, representing 250 grains of red cinchona, were treated with the same weight, each of slaked lime and animal charcoal, the sediment repeatedly treated with cold alcohol, and the mixed alcoholic liquids evaporated. Regarding the residue as nearly pure alkaloids, the barks used in preparing the tinctures were found to contain respectively the following percentages thereof: .287, .81, .871, 1.03, 1.09, 1.13, 1.20, 1.27, 1.38, 1.62, 1.71, 1.78, 2.05, 2.13, 3.09, 3.11 and 4.46, showing a great variation in the quality of the barks employed.

AQUÆ MEDICATÆ.

BY GEORGE W. KENNEDY, PH.G.

(*Read at the Monthly Meeting of the Alumni Association of the Philadelphia College of Pharmacy, Dec. 7th.*)

The process of medicated waters of the Pharmacopœia when prepared in strict accordance with the directions, is not only pharmaceutically objectionable, but also therapeutically and chemically. I propose to take up cinnamon water, discussing it briefly, and pointing out the objections.

1st. When freshly prepared, it is rather pleasing in appearance to the eye, but in a short time it changes, becoming to a certain extent turbid; precipitation soon takes place, and an appreciable amount of deposit is formed at the bottom as well as on the sides of the bottle in which it is kept, thus rendering it unsightly and displeasing to a pharmacist who takes pride in his preparations.

2d. The precipitation is not of so much importance therapeutically, since the water is scarcely ever given for its medicinal virtues, although it certainly possesses some when properly prepared, owing to its pleasant aromatic and carminative properties, its principal employments as an adjuvant to other medicines, the taste of which it masks and disguises satisfactorily.

3d. The chemical objection to the ordinary process with carbonate of magnesium, is that the deposit spoken of above consists of cinnamate and carbonate of magnesium. The cinnamic acid being the result of oxidation of the oil which consists principally of cinnamic aldehyd (C_9H_8O) and variable proportions of hydrocarbon, the oil being of such a composition that it readily absorbs oxygen from the atmosphere, thereby becoming contaminated with resin and cinnamic acid.

The principal objection to medicated waters, prepared with magnesia, when prescribed with the salts of the alkaloids, is that precipitation of the bases takes place, thus making it very dangerous to the patient who may get an overdose at any time.

Mr. Thomas H. Powers as early as 1833 ("Am. Jour. Pharm.") called attention to the solubility of magnesia, and recommended the addition of a small quantity of acid to prevent precipitation. Since then over forty-three years have passed away, and this very important matter has been to a very great extent overlooked, at least by the framers of the

"Pharmacopœia." It gives me much pleasure to say that in looking over our pharmaceutical literature, quite a number of apothecaries will be observed to have been busily engaged in providing a substitute for the magnesia to remedy this defect. Various recommendations have been made from time to time as improvements, the majority of which are decisively good suggestions of the substances recommended to take the place of magnesia. I would enumerate the following: Animal charcoal, silica, pumice stone, glass, kaolin, chalk and paper pulp; then it has been proposed by several writers to dissolve the oils in boiling water, which also seems to answer the purpose admirably and furnish satisfactory products, provided the oils are fresh and not in a oxidized condition.

My object here is to exhibit a vial of cinnamon water, in compliance with a request at our last meeting, as prepared from distillation with the oil, not that I advocate that process altogether, but simply to show what can be done by distillation. This water, upon examination, will be found to be strongly impregnated with the odor, and I believe by diluting with an equal part of distilled water, an article far superior in odor to that made by the ordinary process will be obtained. It is almost colorless, whilst that made with magnesia is of a straw-yellow color. When medicated waters are prepared from the drug, a finer preparation is obtained than when made from the oil; there is a delicate fragrance and flavor about the drug, which is not found in the oils, even in the freshest possible condition in which they can be obtained. Essential oils generally do not keep long; they soon oxidize, and a foreign substance is formed, which to a certain degree unfits them for medicated waters, although if great care is taken of them they will answer the purpose very well, and will please the most particular apothecary. In concluding my remarks, I would say, that the "Pharmacopœia" committee should be reminded of the necessary and absolute importance of making a change in the preparations of medicated waters, which should be made only by distillation from the drug.

Potsville, Pa.

ACIDUM PHOSPHORICUM DILUTUM.

BY RICH. V. MATTISON, PH.G.

(*Read at the Pharmaceutical Meeting, December 19th.*)

To the average reader it seems hardly possible that anything new can be said on this subject, so thoroughly has it been discussed n

this discussion commended upon by recent writers. The "Pharmacopœia" directs either of two processes, directing preferably the oxidation of phosphorus by nitric acid, and the subsequent dilution to the proper specific gravity. The objection to this process, we believe, comes from only one source, viz.: the retail druggist to whom it is both dangerous and insufferably tedious, requiring constant watchfulness regarding temperature, "eternal vigilance" being the only price of safety, beside being a source of constant expense through the breakage of funnels, capsules and the other paraphernalia of the phosphoric acid apparatus usually found at the command of the pharmacist. It is, however, the process usually followed by manufacturers, because of its most striking allurements, viz.: cheapness; and for their benefit we will describe a piece of apparatus employed by ourselves for the past two years in the manufacture of this preparation.

We place in the yard attached to the laboratory a tub of twenty-five gallons capacity, into which we place some smooth bricks, and upon these we place a graphite crucible of say ten gallons capacity, such as are used in the steel works for melting and refining of cast steel, and upon the top of this we insert a funnel and carefully lute the edges with flaxseed meal or clay—having previously placed in the crucible the quantity of phosphorus we wish to convert into phosphoric acid. Into the spout we place a glass tube reaching to the bottom of the crucible, and at the apex insert a small funnel; the apparatus is now complete with the exception of the method of applying heat.

On the upper floors of the laboratory are the steam-pans from which the condensed steam passes through the drip-cock either to the boiler tank or to the ground below. Now we take a small steam-pipe and attach one extremity to the drip-cock and allow the other to terminate into the tub in which stands the acid apparatus. We start the process by putting the phosphorus into the crucible, luting the funnel as before described, and through the tube in the spout, adding the quantity of nitric acid, slightly diluted, that may be requisite. We then allow the condensed steam to fill the tub, and pay no more attention to it excepting to add water or nitric acid as occasion may require. Through the daily use of the steam-pans, stills, etc., there is abundance of condensed and live steam passing into the tub, the water in which is thereby kept constantly hot, without requiring any attention, and the process may go on for weeks without the slightest danger or annoyance to the

motive power which is furnished at a minimum of expense by the waste product (condensed steam) which would be utilized for no other purpose.

A note here regarding the practical working of the first process by the pharmacist. The case in point is this: We had occasion some time ago to drop into the store of a gentleman well known for his pharmaceutical attainments, and who makes it an item of especial pride that "he prepares his dilute phosphoric acid from phosphorus direct." Well, at the time of our call we beheld the "youngest apprentice," we judged from the exceedingly crude methods of manipulation he practised, at work on the official process in question. To say "he took no note of time" is inapplicable, but that "he took no note of temperature" certainly is, for his chief design seemed to be to burn the largest amount of phosphorus in the shortest possible time—the phosphorus being mostly on fire, and dense clouds of phosphoric anhydrid issuing from the mouth of the funnel escaped up the chimney besides clouding the atmosphere of the store. Upon our modestly offering the suggestion that the proper place for the anhydrid was in the capsule instead of the atmosphere, the proprietor rather curtly informed us that "Oh, he (the youngest apprentice before referred to) knows all about it; *he's made it before.*"

These are the facts; the commentary is that if an educated pharmacist is unable to prepare phosphoric acid by this process without losing 50 per cent. of the anhydrid, the acid thereby being proportionately reduced in strength, then the process is not a proper one to be left in the hands of druggists generally for the manufacture of this preparation.

The second process of the "Pharmacopœia" is unsuitable, and should not, on any account, be followed, because of the fact that all the metaphosphoric acid of the market is contaminated with quantities varying from 15 to 35, or more, per cent. of sodic phosphate, which is added to the pure metaphosphoric acid by the German manufacturers for the purpose of causing it to concrete into those beautifully transparent, solid masses, in which shape it is more easily handled commercially.

The objections to this process then are very grave ones, viz.: that the metaphosphoric acid is largely contaminated with sodic orthophosphate which, upon heating, is converted into pyrophosphate, and the resulting acid formed by following the "Pharmacopœia" process is not

only deficient in strength, which varies accordingly with the amount of sodic salt contained therein, but the presence of the pyrophosphate precipitates the corresponding ferric salt when the acid is added to solutions containing iron.

A third process, which is known as "Markoe's process," consists in acting upon phosphorus with bromine in the presence of water. With care the process is esteemed a safe one, but the fact remains that at least one experienced experimenter has had proof positive of the contrary, and we would not recommend the process as one to be left in the hands of the inexperienced, though that it does furnish excellent results at a limited cost is undeniable.

The fourth process is the one we propose for the next "Pharmacopœia." It is not designed for the manufacturer, but for the pharmacist. Its chief feature is simplicity, combined with ease and rapidity of execution. Its simplicity depends upon the ease with which amorphous phosphorus is converted into orthophosphoric acid by the action of nitric acid, and we would propose the following modification of the first official process:

Take of Phosphorus (amorphous), . . . 370 grains;
Nitric acid, . . . 5 troyounces or q. s.;
Water, sufficient quantity.

Add the nitric acid to eight fluidounces of water in a porcelain capsule, and to this add the amorphous phosphorus; raise the temperature of the mixture to boiling, and evaporate until the solution has lost the odor of nitric acid. (It would be almost superfluous to caution the operator at this period regarding the passage of ortho- to pyrophosphoric acid by increased temperature.) When perfectly free from nitric acid it should be diluted to the measure of twenty fluidounces, or to the requisite specific gravity, the arsenic and other impurities, if present, having been previously removed.

Of a sample of acid prepared by this process one hundred grains were neutralized by twenty-four and six-tenths grains of perfectly dry crystals of acid potassium carbonate; solution of ammoniacal nitrate gave a yellow precipitate; it did not coagulate albumen or precipitate with tincture of the ferric chloride when mixed in various proportions.

The operation is finished in fifty minutes, and if judicious note of temperature is taken the finished product is free from pyro- or meta-acids, perfectly free from danger either to person or property, no gauze

spectacles or additional insurance, a process that the youngest apprentice cannot blunder over; easy, efficient and economical, what more could be desired?

Philadelphia, December 1st, 1876.

OIL OF CINNAMON LEAVES.

BY N. A. KUHN.

(Read at the Monthly Meeting of the Alumni Association, P. C. P., Dec. 7th, 1876).

This oil has a sharp, biting taste, with an odor reminding at first very faintly of nutmegs, afterwards strongly of cloves, but if heated with KHO that of cinnamon is predominant. The color is near that of true oil of cinnamon, and the specific gravity is about the same, it being a little heavier than water, sinking when put in that liquid.

It does not fulminate with iodine, does not give any color with nitroprusside of copper, nor with hydrochloric acid; with nitric acid a brown color similar to an iodine stain; with sulphuric acid a violet purple, which is turned brown by nitric acid, as the oil treated with the latter alone is.

A portion was treated in a test tube with a small portion of sulphuric acid and potassium bichromate. In the vapors from this a piece of bibulous paper that had been dipped first in guaiac tincture, then in a weak solution of cupric sulphate, was turned blue, showing the presence of hydrocyanic acid. Care was taken that the oxidizing agent was not in excess, else the benzoic aldehyd, which was generated from the cinnamic acid contained in the oil, would be converted into benzoic acid, which is odorless, and would not give any reaction in the state of vapor.

This reaction, showing the presence of cinnamic acid, was obtained from the distillate of the next also.

Another portion of the oil, after adding some potassa, was heated and the vapor condensed. The part remaining was treated with dilute hydrochloric acid and filtered. To the filtrate nitric acid was added and the liquid concentrated, when a reddish-brown resin and star-shaped crystals, resembling oxalate of ammonium, were obtained.

A solution of the crystals yielded a precipitate with calcium chloride which was insoluble in acetic acid, but soluble in hydrochloric acid

showing an oxalate. This with the brown resin indicates that eugenic acid ($C_{10}H_{12}O_2$) was present.

When the nitric acid was added, an odor so familiar was produced that it took some time to place it. It was that of aromatic vinegar, indicating that acetic acid was also among the products of the decomposition of residue left in the test tube.

SOLUTION OF AMMONIO-CUPRIC SULPHATE AS A TEST FOR GRAPE-SUGAR.

BY FRED. B. POWER.

In some experiments with grape-sugar, the action of a very dilute solution of ammonio-cupric sulphate was observed; this reaction being of some interest, and, to my knowledge not having been previously announced, the following observations may be noted:

If a drop of the ordinary test solution of cupric sulphate (one part of the salt in fourteen parts of water) be allowed to fall into a test tube, a slight excess of ammonia water above that required for the resolution of the precipitate, added, and further diluted with a small quantity of water, by the addition of a few drops of a solution of grape-sugar, and heating over a gas flame to the boiling point, the liquid becomes perfectly decolorized in a few seconds. It was found that a solution containing *one* drop of a solution of cupric sulphate of the above strength, which forms a deeply tinted-blue liquid upon the addition of an excess of ammonia water, becomes perfectly colorless in transmitted and reflected light by heating with *four* drops of a solution of *one* gram of grape-sugar in 100 cubic centimetres of water; this degree of dilution of the saccharine solution seems to approach the minimum for the attainment of a marked result in the use of this test, and corresponds approximately to the detection of 0.005 gram or $\frac{1}{200}$ grain of crystalline grape-sugar.

The decolorized solution after standing for a few hours exposed to the air again assumes its original blue color.

Milk-sugar and dextrin produce the same reaction as grape-sugar, although a somewhat more concentrated solution of dextrin is required.

Pure mannit, which has no reducing effect upon the solutions of Trommer and Fehling, has also no effect upon the ammonio-cupric solution.

Cane-sugar is incapable of affecting this change even in highly concentrated solution and after heating for a much longer time with the ammonio-cupric solution, although it was observed that when associated with grape-sugar a smaller amount of the latter is required for the decolorization of the liquid.

The solution of this salt of copper, as will be observed, being considerably less sensitive than the test solutions of Trommer and Fehling, can by no means supply the place of these valuable reagents, but may add one more to the number of the corroborative tests now in use.

It may also be mentioned in this connection that the solution of ammonio-cupric sulphate has met with a somewhat similar application by virtue of its capability of converting morphia into a basic oxydation product, *oxy-morphia*, $C_{17}H_{19}NO_4$, which, according to Hesse, is identical with another alkaloid of opium, having the same chemical composition, *pseudo-morphia*, and which is insoluble in ether, alcohol and water.

DANGEROUS CANDY.

BY H. G. DEBRUNNER.

On a recent trip to Massillon, O., I happened to pass the show-windows of a fine confectionery store, where a beautiful display of candies wrapped in brilliantly-colored paper of all shades could be seen. My attention was especially directed to some "kisses" enclosed in green paper. Suspecting that the pigment might be Paris-green, I purchased a small quantity of the suspected candy, and subjected the paper in which it was wrapped to a careful chemical analysis, with the following alarming results:

Size of one piece of paper,	3 × 2½ in.;
Average weight of one piece of paper,	0.302 grm. (5 grains);
Quantity of pigment in one paper,	0.062 grm. (1 grain);
Quantity of arsenic, As_2O_3 , in one paper,	0.032 grm. (½ grain);
Quantity of cupric oxide, CuO , in one paper,	0.022 grm. (⅓ grain);
Corresponding quantity of met. copper, Cu ,	0.017 grm. (¼ grain).

Paris green, aceto-arsenite of copper may be considered a combination of arsenite of copper, or Scheele's green and acetate of copper, or verdigris, thus uniting the poisonous qualities of copper-salts and arsenic.

The qualitative analysis (presence of copper, acetic acid and arsenious acid) led to the conclusion that the pigment of these papers really was the above named and previously suspected substance.

The fatal dose of arsenic for an adult is from 2 to 5 grains; a dose of half a grain, however (as contained in one paper of the above size), will already produce severe symptoms of poisoning; the medicinal dose, according to the "U. S. Dispensatory," being $\frac{1}{20}$ to $\frac{1}{10}$ of a grain for an adult.

The poisonous pigment is made to adhere to the paper by a simple mechanical process—the adhesion is but very slight, and friction, as well as moisture, will loosen it entirely. If such candy is given to children, particularly to small ones, who may take the colored paper in the mouth, or handle it with wet hands, they are in danger of being poisoned.

It is difficult to understand how people can be so devoid of conscience and reckless to employ for such a purpose such dangerous paper, or if it is ignorance, is it excusable? Is such a practice too trifling a matter for the Boards of Health to notice?

Otto, the eminent German toxicologist, mentions a case where two children lost their lives through a Christmas present—a toy painted with Paris-green. The danger is still greater if eatables are enclosed in such poisonous paper.

It would be superfluous to dwell on the dangerousness of wall-paper, lamp-shades, artificial flowers, fancy letter-paper, gauze, etc., colored with Paris green; but it should be considered a duty to humanity to direct the attention of the public to such facts like the above.

The analysis: five pieces of paper were treated with nitric acid to dissolve the pigment, converting at the same time arsenious into arsenic acid. The filtered solution was neutralized with caustic soda, the copper precipitated with sulphide of sodium as sulphide of copper, the precipitate washed, dried, ignited with the usual precautions and weighed as cuprous sulphide, Cu_2S .

Arsenic was precipitated from the filtrate on addition of hydrochloric acid and sulphuretted hydrogen as trisulphide of arsenic. It was filtered off, washed, and redissolved in nitric acid, thus forming arsenic acid. The clear solution was diluted to 100 cc.

20 cc., representing one piece of paper, were again precipitated with

sulphuretted hydrogen as trisulphide of arsenic, As_2S_3 , and weighed on a tared filter.

20 cc., heated with sulphuric acid, H_2SO_4 , and then introduced in Marsh's apparatus, yielded very large arsenic mirrors.

20 cc. were precipitated with chloride of ammonium, ammonia, and chloride of magnesium. The voluminous precipitate was filtered off, etc., dried at 212° , on a tared filter, and weighed, as $\text{NH}_4\text{MgAsO}_4 + \text{H}_2\text{O}$, ammoniated arseniate of magnesium.

The remaining 40 cc. were used for different qualitative tests.

The total amount of pigment was determined by extracting one paper with ammonia,¹ and evaporating the blue filtrate on a watch-glass.

From five papers, of before-named size, I was able to extract a globule of metallic copper with the blow-pipe, weighing 0.076 grm., = $1\frac{1}{4}$ grain. I also have several arsenic mirrors, arsenious acid (in beautiful octahedrons and tetrahedrons, visible with the microscope), sulphide of arsenic, etc., as corpora delicti, on hand, each sample being extracted from one piece of this candy-paper.

Owing to the fact that "Paris green," if perfectly soluble in ammonia, is considered "pure," manufacturers often adulterate it with arsenic, which does not interfere with the solubility. This seems to have been also the case with the pigment analyzed, the amount of arsenic found being rather large.

The analysis was executed with care, and the correctness of the results confirmed by duplicate assays.

Navarre, O., Dec. 4, 1876.

GLEANINGS FROM THE FOREIGN JOURNALS.

BY THE EDITOR.

Comparative Assay of Male Fern.—The rhizomes collected in the spring and fall are, according to Kruse, of a deeper green color and a stronger odor than those collected in summer. To ascertain the variations in the composition of the rhizome collected at different seasons in 1874, comparative assays were made, with the following results:

¹ Practical test for purity of Paris green, which is entirely soluble in ammonia.

Resina Guaiaci Peruviana Aromatica.—Gehe & Co. have sold under this name for about 15 years, a yellowish-brown resin, which they obtained from Paris, but could ascertain nothing regarding its origin. In thin splinters it is transparent, glossy and of a wine-yellow color; the recent powder is yellow. It fuses at 90° C., has a strong odor reminding of rue, anis and lemon, which does not solely depend upon the volatile oil, and an acrid not agreeable taste. It does not turn blue or green on exposure, or by oxidizing agents. It dissolves readily and almost completely in alcohol, ether, chloroform and carbon bisulphide, the solutions leaving on evaporation an amorphous residue. Sulphuric acid colors the resin red, nitric acid decomposes it.

Adolf Kopp obtained from it by distillation with water 4 per cent. of a yellow neutral volatile oil, having an odor reminding of peppermint and lemon. On rectification, the boiling point rose from 168° to 280° C. It contains oxygen, the hydrocarbon having the composition $C_{10}H_{16}$.

On treating the resin with fusing potassa, protocatechuic acid appears to be formed. With nitric acid a white nitro compound is obtained and finally oxalic acid. Among the products of the dry distillation of the resin was a volatile oil, which acquired a deep blue color in that portion the boiling point of which rose above 260° C.—*Archiv d. Phar.*, Sept., 1876, 193–206.

Sulphomolybdate of Ammonium as a Reagent.—J. B. Nagelvoort has experimented with the various reagents recommended for the detection of morphia, more particularly with iodic acid, with Husemann's test (orange color, on adding nitric acid to the solution in sulphuric acid), and Schneider's test ("Amer. Jour. Phar." 1873, p. 545), but he found Buckingham's test (*Ibid.*, p. 150) far more delicate. He has also examined the behavior of the latter test to several other principles and confirmed, in the main, Buckingham's results. To avoid the decomposing influence of the light, the tests were applied in the dark, whereby the final changes of the color appear to be greatly retarded, the light or dark blue color being in some cases produced only after one or two days. .00001 grm. of morphia was detected by the beautiful purple color instantly produced by the reagent, which is ten times more delicate than Froehde's similar reagent. Mixed with milk-sugar .00003 morphia could be detected, milk-sugar alone turning blue only after some minutes' contact with the test liquid. Starch granules become blue very rapidly with Buckingham's test, the liquid remaining colorless.—*Archiv d. Phar.*, Sept., 1876, 249–254, from *O. I. Tijdschr.*

Clarified Honey is obtained by E. Dannenberg, of unexceptionable quality, by diluting the crude honey with half its weight of water, boiling for 15 or 30 minutes, according to the quantity operated upon, the scum being carefully removed; and then adding five or six times sufficient cold water to interrupt the boiling for not over half a minute. After boiling for another 15 minutes, the hot honey is strained and evaporated. Thus prepared the author has kept the honey unaltered for over two years.—*Archiv d. Phar.*, Sept., 1876, 276.

Extract of Hyoscyamus.—R. Huguet observed in an old extract a large number of crystals, the principal form of which was the regular octohedron, in some cases with combinations of the cube. By incineration he obtained between 22.28 and 31.5 per cent. of fixed residue, containing from 5.12 to 8.4 of potassium chloride.—*Rép. de Phar.*, 1876, p. 545.

Mercurial Ointment.—E. Dannenberg recommends for the rapid extinction of the mercury to triturate 500 grams with about 80 grams of lard and 15 to 20 grams of olein, after which the remaining fat is added.—*Archiv d. Phar.*, Sept., 1876, 256.

The Preparation of Sulphide of Iron is best accomplished, according to Dr. Méhu, by mixing two parts of finely powdered pyrites or bisulphide of iron with one part of powdered iron, and heating the intimate mixture in a Hessian crucible to redness for half an hour. It is unnecessary to increase the heat to fusion; a grey mass is obtained which is easily pulverized, and in contact with hydrochloric acid, copiously evolves sulphuretted hydrogen.—*Zeitschr. d. aest. Apoth. Ver.*, 1876, p. 413.

Adulterated Sulphate of Quinia has been noticed in France by Dr. P. Jaillard; it contained the almost incredible amount of 70 per cent. of potassium nitrate. The adulterated article had the appearance of the pure salt, but possessed a bitter and saline taste, was to a large extent soluble in water at the ordinary temperature, only in part soluble in strong alcohol. The aqueous solution heated with an acid solution of ferrous chloride, oxidizes the latter readily. The salt heated upon the blade of a knife deflagrates and leaves a white ash.—*Jour. de Phar. et de Chim.*, Nov., 1876.

Reactions of Phenol with some of the Cinchona Alkaloids.—By O. Hesse (Liebig's Annalen, clxxii, 160-163).—When equal

molecular weights of cinchonidia and phenol are dissolved in dilute alcohol and mixed, an oily liquid separates and on standing becomes crystalline; if strong alcohol be employed, fine crystals are produced, constituting colorless, glassy, odorless prisms, stable in the air, but evolving phenol on heating: these have the composition $2C_{20}H_{24}N_2 \cdot O \cdot C_6H_6O$, whence the author terms the compound *semi-phenol cinchonidia*; the whole of the associated phenol is expelled at 130° and is lost on repeatedly crystallising from alcohol. This substance is capable of combining with acids, *e. g.*, sulphuric acid forming the double phenolo-sulphate formerly described (this Journal, 1876, ii, 313)¹; in alcoholic solution it has a strongly alkaline reaction, and precipitates ferric oxide from a solution of a chloride. Addition of excess of acid causes the separation of phenol, a cinchonidia salt being formed.

If 2—3 molecules of phenol are employed for one of cinchonidia, crystals are obtained containing more phenol, being represented by the formula $2C_{20}H_{24}N_2O \cdot 3C_6H_6O$; whence the author terms this body *sesqui-phenol cinchonidia*. No more phenol becomes added on recrystallization from alcohol containing much phenol; on solution in hot alcohol, or on gentle heating, the crystals are partly decomposed, with evolution of phenol; when one part of sesqui-phenol cinchonidia is dissolved in about five of alcohol, the crystals which separate have about the composition of *semi-phenol cinchonidia*; with larger quantities of alcohol a smaller amount of phenol is retained, and finally pure cinchonidia separates. On saturating the hot alcoholic solution with sulphuric acid, cinchonidia phenolo-sulphate $2C_{20}H_{24}N_2O \cdot C_6H_6O \cdot H_2SO_4 \cdot 4H_2O$ crystallizes out on cooling.

Although quinia and cinchonidia readily combine with phenol, the dextro-rotatory cinchona alkaloids, cinchonina, quinidia and quinamina crystallize unchanged from an alcoholic solution containing phenol, whatever may be the proportion between the alkaloid and phenol present.—C. R. A. W. in *Jour. Chem. Soc.*, Dec., 1876.

Solubility of Salicylic Acid.—B. Kohlmann states that 300 parts of water fail to retain one part of salicylic acid in permanent solution, even at the summer temperature. The addition of sodium phosphate and similar salts having an alkaline reaction is considered to be inadmissible, because the antiseptic properties are thereby impaired. Glycerin and alcohol do not materially increase the solubility in water unless added in considerable proportion. A very convenient solvent is

¹ "Amer. Jour. Phar.," 1876, p. 325.

found in the officinal solution of ammonium acetate, which will dissolve 20 per cent. of salicylic acid. The simplest way to effect the solution is to dissolve, by agitation, 10 parts of salicylic acid in 24 parts of officinal ammonia water, and then add enough acetic acid until a slight acid reaction is obtained. The solution has a saline taste, which is not at all unpleasant.—*Jour. f. Prakt. Chem.*, 1876, p. 286.

[If this solution is made to correspond in strength with the liquor ammonii acetatis, "U. S. P.," it should be diluted with water until it measures eight times the bulk of the officinal acetic acid employed for neutralization. Whether such a combination possesses antiseptic properties equal to those of the salicylic acid contained therein is not stated. It should, however, be borne in mind that, according to recent observations, salicylic acid combined with alkalies, appears to be by no means without medicinal effect, the carbonic acid contained in the blood being regarded as an efficient agent to liberate the salicylic acid. See also "Amer. Jour. Pharm.," 1876, p. 277.—EDITOR AMER. JOUR. PHARM.]

Estimation of the Alkaloids of Sabadilla and Physostigma.
 —E. Masing has found that pure *veratria*, dissolved with the requisite quantity of acid in 14,670 parts of water, yields, with Mayer's solution, a faint turbidity just recognizable, while on the addition of 1 per cent. H_2SO_4 the limit is reached with a dilution of 1 in 11,400.

The *sabadillia* double iodide dissolves in 17,630 parts of pure water, and in 19,300 parts of water containing 1 per cent. sulphuric acid.

The solubility of the hydrargyro-iodide of *sabatrina* is greater than that of the preceding alkaloids; in pure and in acidulated water, containing 1 per cent. H_2SO_4 it appears to be 1 : 2450.

Commercial veratria gives, with Mayer's solution, a larger indication of alkaloid than that employed (in one case 0.8645, instead of 0.7772 grams used); the cause for this variation, which in the presence of *sabadillia* and *sabatrina* should be smaller instead of larger, has not been ascertained. Air-dry *sabadilla* seeds indicated an amount of alkaloids, which, if calculated as *veratria*, was equal to 3.61 per cent.

Physostigmia, prepared by Vée and Leven's process ("Amer. Jour. Phar.," 1865, p. 204), ceases to react with Mayer's solution when dissolved in 9500 parts of pure water, or in 8800 parts of acidulated water, containing 1 per cent. H_2SO_4 . One kilogram of Calabar beans

treated in this manner, yielded only 0.7482 grams of alkaloid, while Mayer's test solution indicated, in two experiments, 0.399 and 0.433 per cent. respectively.—*Archiv d. Phar.*, October, 310-317.

The Constituents of Tolubalsam.—By E. Busse ("Deut. Chem. Ges. Ber.," ix, 830).—Somewhat contradictory results have been arrived at by Frémy, Deville, Kopp, Scharling and Carles, partly at least due to the fact that the mode of operating was calculated in some cases to bring about decomposition of the bodies originally present. The author dissolved 1 kilo. of partly resinized tolu balsam in 2 litres of ether, filtered the liquid from a little insoluble matter, and then agitated it with 2 litres of soda-solution containing 100 grams Na_2O ; after agitating the ethereal liquor again with soda, and washing with water, a residue was obtained on distilling off the ether, consisting of 85 grams of fluid neutral compounds. On fractional distillation, a little passed over below 200° , more between 250° and 300° , and most of all above 320° . The first of these fractions appeared on analysis to be impure benzylic alcohol; it formed benzoic aldehyd and acid on oxidation. The second gave a distillate at 300° , consisting of *benzyl benzoate*, $\text{C}_{14}\text{H}_{12}\text{O}_2$; on saponification it formed benzylic alcohol and a benzoate. The third portion consisted of *benzyl cinnamate*, $\text{C}_{16}\text{H}_{14}\text{O}_2$; it furnished cinnamic acid and benzylic alcohol on saponification, and had the spec. grav. 1.1145 at 16° .

Hence the neutral constituents of tolu balsam are the same as those found by Kraut in Peru balsam, only they exist in smaller quantity and different proportions, benzyl cinnamate forming the majority in the first, benzyl benzoate in the second.

The soda liquors obtained as above described were saturated with carbonic acid, whereby much resin was precipitated; the filtrate yielded a precipitate on addition of hydrochloric acid; one-half of the cinnamic acids thus thrown down was boiled with milk of lime; a sparingly soluble lime salt was thus obtained containing (after recrystallisation) 10.26 per cent. of calcium, the cinnamate requiring 10.30 per cent.: from this cinnamic acid melting at 133° was isolated. The mother-liquors of the sparingly soluble calcium cinnamate contained much calcium benzoate, which crystallized out after concentration; this gave (after several recrystallizations) numbers agreeing with the formula $\text{Ca}(\text{C}_7\text{H}_5\text{O}_2)_2 + 3\text{H}_2\text{O}$; and from it benzoic acid was precipitated, melting at 120.5° .

The other half of the mixture of acids was dissolved in alcohol and treated with hydrochloric acid gas; by fractional distillation the ethers thus formed were separated; the portion distilling at 215° gave numbers agreeing with the formula $C_9H_{10}O_2$, *ethyl benzoate*; that passing over at 265° agreed with $C_{11}H_{12}O_2$, *ethyl cinnamate*.

Hence tolubalsam contains free benzoic and cinnamic acids, as well as their benzylic ethers.—C. R. A. W. in *Jour. Chem. Soc.*

Analysis of Pumpkin Seeds.—Nicolai Kopylow has ascertained that these seeds contain no alkaloid, nor could the presence of a glucoside be established which, by Dorner and Wolkowitsh, was supposed to exist therein and named by them cucurbitin (1870). The last named authors had found 44.50 fixed oil, 32.75 starch and traces of volatile oil, resin, sugar and coloring matter. Kopylow ascertained the fat to consist of the glycerides of palmitic, myristic and oleic acids, and the fat extracted by ether also to contain free fatty acids.—*Phar. Zeitschr. f. Russl.*, 1876, No. 17.

Euryangium Sumbul, according to Carl Wittmann, occurs very frequently in the neighborhood of Chabarowka, on the Amoor river in Eastern Siberia, and attains a height of 1.5 metres. The fleshy branching root has at its base a diameter of 0.09 metre, and possesses a strong musk odor which is increased when the root is moistened with water. The stem is fleshy; leaves are twice or thrice pinnate, pinnæ lanceolate and sharply serrate; umbels composed of 30 to 50 rays; flowers white and small. It is called by the natives *ofunkgi* or *ouchi*; by the Chinese *xsouma-tschen-tuk*, and by the Russian inhabitants *bear's claw*, and is medicinally employed in various diseases.

Another umbelliferous plant occurs there having considerable resemblance to the former, but being somewhat smaller, the leaves lighter colored and the root destitute of musk odor.—*Ibid.*, No. 18.

A GLYCEROL OF NITRATE OF BISMUTH.

BY BALMANNO SQUIRE, M.B., LOND.,

Surgeon to the British Hospital for Diseases of the Skin.

A note I contributed to the "Pharmaceutical Journal" (see "Am. Jour. Phar." 1876, p. 318) on glycerol of subacetate of lead, this summer, has been followed by the adoption of that preparation as a remedy, not only in skin diseases (particularly in chronic eczema, the

purpose for which I had designed it), but also quite as much in uterine diseases. I am encouraged, therefore, to propose now a soluble preparation of nitrate of bismuth, if such a proposition is not too absurd to be listened to.

The value of bismuth as an application in a great variety of skin diseases is well known, but its use in this direction, and indeed as I may say for every purpose for which bismuth has yet been employed as a remedy, has always been much crippled by the difficulties that have always hitherto existed in the way of obtaining a solution of bismuth.

There is of course the liquor bismuthi et ammoniæ citratis of the "Pharmacopœia," but it is a matter of doubt whether this double salt presents the properties, as a local application, of a simple salt of bismuth. It is of course merely as a local application that bismuth is employed in medicine, that is to say as a local application to the stomach in cases of painful digestion or of waterbrash, and its use in skin affections, in gonorrhœa, and so forth, is equally of the character of a topical application.

The difficulty, or rather the impossibility, of making an aqueous solution of nitrate of bismuth, otherwise than in the presence of a large excess of nitric acid (an agent which renders that solution perfectly useless for any purpose for which bismuth is serviceable), arises from two causes, the one the feeble basic properties of teroxide of bismuth, and the other the basic properties of water,—the water robbing the nitrate of bismuth of the greater portion of its nitric acid, and so precipitating nearly all of the bismuth in the form of the so-called trisnitrate.

It occurred to me, accordingly, that by the employment of glycerin as a solvent in place of water, both of these drawbacks might be circumvented, if only it should prove that nitrate of bismuth should be capable of solution in glycerin. I find that it is freely soluble in glycerin, and that it dissolves without decomposition. As I think there is likely to be a large demand for this solution, I think it necessary to communicate this fact to the pharmaceutical body through their journal. For example, I applied to one of the first pharmaceutical chemists of this city for a solution of nitrate of bismuth in glycerin, and I was told, firstly, that the salt would certainly not dissolve in glycerin, so that he could not supply me with such a solution, and in the next place he told me that the nitrate was not kept by any chemist because there was no demand for it.

Now I think that henceforth the nitrate should be kept by every chemist. I will explain why I think so. In the first place its solution in glycerin will prove without doubt the most valuable means of applying the remedy to any external surface, and in the next place it will serve equally as a means of administering bismuth internally, or if it be desired that an aqueous solution should be so administered, even that may be done. For on diluting freely the glycerol with water, the presence of glycerin, as I find, serves to delay the precipitation of the bismuth by water, so that for quite half an hour, at the least, no turbidity whatever takes place, provided the water used be cold water. It seems to me, moreover, that the presence of glycerin absolutely prevents, even after the lapse of several hours, the precipitation of more than a small proportion of the contained nitrate; insomuch that I have reason to believe that a merely moderate dilution of the glycerol might leave a permanently clear solution, but I have not as yet made quantitative experiments on this head.

We accordingly have henceforward at our command a preparation which has for long been a desideratum, and one the contrivance of which has baffled the efforts of the compilers of our "Pharmacopœia," and indeed the efforts of every one who has devoted attention to the point.

I was assured on all hands that if I ever should succeed in getting by any means a solution of nitrate of bismuth, I should find that I had before me a very irritating application instead of what I desired, that is to say, a bland astringent. But I have sucked my glycerol; I have even rubbed it into my tongue, and I find it to be merely what I had designed it to be, and that is a bland and mild astringent. It is obvious that a soluble preparation of a drug is a much more efficient and certain mode of employing it than an insoluble one, and that a simpler preparation of the article is likely to prove a more active and serviceable mode of administering it than any more complicated preparation of it. I accordingly lay the results of my investigation before the pharmaceutical body in the confidence that they will soon develop its capabilities in a very considerable degree.

As an application to the throat, the larynx, the vagina, the uterus and the urethra, as well as to the skin, and no less as an internal remedy, I believe the preparation of glycerol of nitrate of bismuth will be found to open out a new field of therapeutics.

Since writing the above, I find the glycerol of nitrate of bismuth to be a somewhat more stimulant application, in cases of eczema, than a glycerol of the subacetate of lead of corresponding strength.

On the other hand, I find by sucking the actual crystals of the nitrate of bismuth, that the salt is in no degree a caustic, and not more acid to the taste than crystals of citric acid.—*Phar. Jour and Trans.*, Nov. 11, 1876.

SOLVENTS OF SALICYLIC ACID.

By J. C. THRESH, PHARMACEUTICAL CHEMIST.

To increase the facility with which salicylic acid may be administered, various substances have been proposed, which increase in a remarkable manner the solvent action of water upon it. The salts usually employed for this purpose are borax, phosphate of soda and citrate of ammonia, and my experiments were undertaken to ascertain whether or not this increased solubility was due to some chemical decomposition between the acid and the salts employed, and if the solutions thus formed possessed the antiseptic and antifermentative properties of the free acid.

Borax.—This salt is remarkable for its solvent action upon a large number of organic compounds, the nature of which action is not, in most cases, yet ascertained. If borax and salicylic acid be mixed in a mortar, the result is a damp almost pasty mass. The taste at first is simply that of the acid and borax, but in a very short time it begins to acquire a bitter taste, and after a few hours it will be found to be intensely bitter. If a little of the freshly prepared mixture be carefully fused the resulting mass at once becomes exceedingly bitter, and if the proportions employed were one of borax to two of acid, the mass is soluble in about twice its weight of water. A dilute solution of five gr. each of acid and borax in one ounce of water is devoid of bitterness, and remains so even after keeping a length of time, but stronger solutions soon become bitter. I have failed as yet to ascertain the nature of this reaction, or to isolate the bitter product, unless a crystalline deposit, which is slowly forming in a solution of 2.5 borax, 4 acid and 50 water, which is evaporating spontaneously, proves to be the substance in question.

Phosphate of Soda.—This salt has not a solvent effect equal to

that of either borax or ammonium citrate. One part of salicylic acid requires

2 parts of phosphate to form a solution with 50 parts water.					
2.25	"	"	"	25	"
2.5 ¹	"	"	"	12.5	"

Solutions 1 and 2 are colorless, but the strongest solution has a slight pink tint (characteristic of salicylic salts). Diluted with water, ferric chloride added in excess gives a purple red solution, which also indicates the existence of a salicylic salt, since whilst free salicylic acid strikes a purple color with ferric chloride, its salts give a deep-red coloration with this reagent. No phosphoric acid, however, is liberated, for a single drop of the dilute acid added to the solution causes a precipitation of salicylic acid.

Ammonium Citrate.—I first ascertained, by experiment, that this citrate, whilst increasing the solubility of salicylic acid in water to a much greater extent than sodium citrate, yet possesses no advantages over potassium citrate, and as this latter was more convenient for my purpose, I have employed it in preference.

Table of solubility of salicylic acid in potassium citrate solution :

Salicylic Acid	1	Citrate	.75	Water	100
"	1	"	1.0	"	50
"	1	"	1.15	"	25
"	1	"	1.25	"	20
"	1	"	1.4	"	12.5
"	1	"	1.5	"	7.5

A stronger solution than the last solidifies upon cooling, but the nature of the mass I have not yet ascertained. It gives reactions indicative of free and combined salicylic acid and of combined citric acid, but not of free citric acid. An alcoholic solution of potassium salicylate, mixed with a similar solution of citric acid, gives a precipitate of potassium citrate, which readily dissolves on the addition of a little water, and the solution thus formed is miscible with water, without precipitation of salicylic acid. 1 dram Acid. Salicylic, $3\frac{1}{2}$ drams. Sp. Vin. Rect., 1 dram. Pot. Cit. and $3\frac{1}{2}$ drams. Water, form a solution miscible with water in all proportions, and 2 drams of which contain 15 grains of the acid. In this solution diluted acetic acid gives no precipitate, citric acid causes a precipitate to form slowly, mineral acids throw down the salicylic acid instantly; ferric chloride colors the fluid purple-red.

¹ Three drams would contain a full dose (fifteen grains nearly) of salicylic acid.

To ascertain the antiseptic value of the solutions formed by aid of these salts, I added them to a number of infusions (malt, quassia, calumba, etc.), to grape-juice and flour-paste, and so far as I can tell after the lapse of two months, with the exception of flour-paste and grape-juice, the solutions are equally as fresh as those prepared with free salicylic acid.

To test their antifermentative powers, I prepared over thirty mixtures of flour (1 oz.) and water ($\frac{1}{2}$ oz.) with 20 grains of German yeast in each, and added thereto various proportions of free salicylic acid, of potassium salicylate acidified with acetic acid and of salicylic acid dissolved by aid of borax, phosphate of soda and citrate of potash, and in the cases where no fermentation ensued, I confirmed the result by repetitions of the experiments.

The smallest quantity of free salicylic acid, which uniformly prevented the rising of the dough, was 1 grain. The acidified salicylate of potash had not the slightest effect unless added in large proportions. 1 grain of acid in borax solution was equally as powerful as the free acid. A similar quantity dissolved by aid of ammonia citrate or sodium phosphate only retarded for a variable time the fermentation, but in both cases $1\frac{1}{4}$ gr. was found effectually to arrest it.

It is, therefore, evident that some reaction as yet undetermined does take place between the salicylic acid and the salts employed as its solvents, yet that, in whatever state the salicylic acid exists in the above named solutions, it is capable of exhibiting in a high degree all those properties which have conferred upon it such notoriety.—*Phar. Jour. and Trans.*, November 25th, 1876.

PROCESS FOR MANUFACTURING "CINCHONA FEBRIFUGE" AT SIKKIM.

BY C. H. WOOD, GOVERNMENT QUINOLOGIST.

The present method of treating cinchona bark was adopted as a temporary measure to afford the means of ascertaining the medicinal value of the proposed febrifuge. It was considered undesirable to incur any large expenditure for factory buildings, machinery or skilled labor, until the efficacy of the product as a remedial agent had been thoroughly determined by extensive trials. Consequently, it was necessary to so arrange the process that it could be conducted for some time on a considerable scale, and involve no other appliances than such as

were already at hand. The dry bark is crushed into small pieces, but not powdered, and is put into wooden casks, where it is macerated in the cold with very dilute hydrochloric acid. The liquor is then run off into wooden vessels, and mixed with an excess of a strong solution of caustic soda. A precipitate forms, which is collected on calico filters, and well washed with water. The precipitate is then dried at a gentle heat, and powdered. It constitutes the crude febrifuge, which is next submitted to a process of purification. In the latter process a certain weight of the crude product is dissolved in dilute sulphuric acid, and a small quantity of a solution of sulphur in caustic soda is added to the liquor. After the lapse of twenty-four hours the liquor is carefully filtered. The filtrate is mixed with caustic soda, and the resulting precipitate collected on calico, washed with a small quantity of water, dried and powdered. It is then ready for issue, and is sent out under the name of "Cinchona Febrifuge." A position for the factory sheds was chosen conveniently near the dry bark go-downs, and so situated on the side of the hill that a copious supply of water could be obtained at a level with the roof of the sheds in which the maceration is conducted. These sheds are rough, temporary erections, constructed with saplings and a mat or thatch roof. Down the centre an open drain is cut to carry off the waste liquor. Over this drain some wooden stands are placed, on which the calico filters rest. The filters are formed by tying a square piece of calico to a wooden frame by the four corners. On each side of the shed is placed a row of twenty-one casks, standing on end upon a stand which elevates them about two feet from the ground. They are empty beer barrels, which have been purchased from the Commissariat Department at Darjeeling, the head removed, and the cask thoroughly cleansed. A hole is cut in the side of the cask at a level with the bottom, and closed with a cork. In front of the casks a row of tubs, formed by cutting beer barrels in halves, is placed, so that on uncorking the barrels the liquor will run out into the tubs. Outside the shed, at one end, are a couple of large wooden vats, at such an elevation that liquid can flow from them along a bamboo trough into any one of the barrels in the shed. The capacity of the vats, up to a mark on the inside near the top, is accurately determined. Water is run into the vat up to the mark, and a certain quantity of muriatic acid is added, and the whole well mixed. This diluted acid can then be run into any one of the casks in a line with

the vat, by means of a bamboo trough. In addition to the macerating sheds, there is a small brick building, heated with charcoal, in which the precipitate is dried; also a separate shed, in which the process of purification is conducted. The casks are worked in sets of three, and are marked A, B, C. In each shed there are fourteen sets, seven on each side. Each cask receives one maund of dry bark, which undergoes four successive macerations, the liquor being moved in rotation through the three casks. Each maceration lasts half a week. The liquid used for the fourth and last maceration is acidulated water drawn from the vat. When this is run off, it is moved into the next cask to form the third liquor. When this is drawn off, it forms the second liquor for another cask, and when transferred from that, it goes on to new bark, from which it is drawn off and precipitated. Of course, in starting a new shed every cask contains dry bark, consequently the system of rotation is not brought into full operation until after the first fortnight, and it is only after the shed has been in operation for three and a half weeks that the liquor for precipitation has been used for four macerations. The liquor that is for precipitation is run into the tubs. The other liquors are drawn into wooden buckets and poured into the proper casks. The new acid is then drawn from the vats. The diluted acid is made in the vat by adding one gallon of muriatic acid to every hundred gallons of water—ten fluidounces to each cubic foot. If three sheds are employed, No. 1 is worked on Mondays and Thursdays, No. 2 on Tuesdays and Fridays, and No. 3 on Wednesdays and Saturdays. Each set of three casks exhausts one maund of dry bark per week. Three sheds, therefore, containing forty-two casks each, would exhaust forty-two maunds of bark every week. The weight of acid used in the exhaustion is six and a half per cent. of the weight of dry bark. It is obtained from Mr. Waldie's chemical works at a cost of three and a half annas per pound in Calcutta. To precipitate the saturated liquor, a solution of caustic soda is added in excess. The caustic soda is obtained from England in five-cwt. drums, costing from £15 to £20 per ton in London. One part of this is dissolved in three parts of water, and the solution stored in iron vessels. The quantity to be added to the bark liquor must be judged of by the appearance produced. When a sufficient quantity has been introduced the precipitate assumes a somewhat curdy condition.

About six and a half pounds of solid soda are used for every hundred

pounds of dry bark. The filtration is not commenced until the following day, when the liquor is transferred to the calico strainers, which have been well wetted. The first portions that run through are returned, until the liquid passes of a bright ruby color; it is then allowed to flow away by the drain. After all the liquor has drained off, water is passed through the precipitate until it ceases to acquire a red tint. The alkaloids on the filter should then be of a uniform cream color. The precipitate is now dried and reduced to a fine powder, which is stored in suitable bins. It constitutes the crude febrifuge. The precipitate, during the act of drying, acquires a slightly reddish-brown color. It is, therefore, submitted to a process of purification. Fourteen gallons of water are mixed with two pints of sulphuric acid, and twenty pounds of the dry powder are introduced. The alkaloids dissolve, and a quantity of coloring matter remains insoluble. About half a pint of a solution of sulphur in caustic soda is now stirred in, and the whole allowed to stand for twenty-four hours. It is then filtered through calico into a clean vessel, care being taken to get the liquor perfectly bright. About six gallons of water are used to wash the sediment left on the filters. The clear filtrate is thoroughly mixed with solution of soda to precipitate the alkaloid. The precipitate is collected on calico, washed with a small quantity of water, drained, dried and reduced to fine powder. It is then ready for issue. Wooden tubs are used for this process, but they are not so well suited for the purpose as enameled iron or earthenware. The purification is conducted in a separate shed by a man who is confined to that work. The only workmen employed in the factory are Nepalese coolies. When the process is once brought into full operation, it is found that these men readily master every detail, and conduct the whole thing with all the care and accuracy that is required. But, of course, the factory is under the supervision of Mr. Gammie, the officer in charge of the plantations, who visits it once a day and sees that the work is being properly performed. Dry *succirubra* bark only is employed. Moreover, care is taken to mix the root, stem and branch bark together in as nearly as possible the proportions in which they are yielded by the plantations.

This mixture is broken into small pieces, and a maund of it goes into each cask. This is done to insure uniformity of composition in the product. Green bark is never operated on. It will be seen that the

arrangement of the process requires that a certain weight of bark should be put into the casks every week throughout the year. This could not be done with green bark, because bark is only taken from the trees twice per annum. Apart from this, however, it has been found that dry bark yields a much better product, and quite as large a quantity. The small cost of drying the bark is more than counterbalanced by the advantages gained. It must be remembered that this method has only been adopted to furnish a large supply of febrifuge for trial. It does not profess to make the most economical use possible of the bark. The factory is estimated to turn out during the present financial year four thousand eight hundred pounds of febrifuge, which at a rupee (2s.) an ounce, will pay the whole cost of the plantations and manufacture for the year. If the product proves to be of permanent value as a remedial agent, it is probable that the process will be considerably modified to produce greater economy, but involving the use of permanent buildings and machinery.—*Jour. App. Sci.* [Lond], December 1st, 1876.

ERYTHROPHLÆUM GUINEENSE, and E. COUMINGA.

By N. GALLOIS and E. HARDY.

The *Erythrophlæum guineense* is a tall tree belonging to the family *Leguminosæ*, and growing along the west coast of Africa. Its wood is very hard, and is covered with a hard fibrous and odorless bark, which contains an active poison, and to which the name of *erythrophleina* has been given. *Erythrophleina* is a base and may be obtained by extracting the pulverised bark with alcohol, evaporating the tincture to a small bulk, treating this with warm water, evaporating the aqueous extract at a low temperature, rendering it alkaline with ammonia, or sodium carbonate, and extracting with acetic ether. On evaporating the resulting solution the base is left. It is only slightly soluble in ordinary ether, in benzol or in chloroform, but dissolves in water, acetic ether, amylic alcohol, and ordinary alcohol. It forms salts with acids, and its chloride is precipitated by platinic chloride, forming a double salt. The following reactions have been noted with solutions of *erythrophleina*:—

Picric acid : yellow-green precipitate.

Iodine, in potassium iodide : reddish-yellow precipitate.

Iodide of mercury and potassium : white precipitate.

Iodide of bismuth and cadmium : flocculent white precipitate.

Potassium bichromate : yellowish precipitate.

Mercuric chloride : white precipitate.

Auric chloride : whitish precipitate.

Palladic chloride : white precipitate.

In contact with manganese peroxide and sulphuric acid, it develops a violet color (less intense than that produced under similar circumstances by trychnia), which soon changes to a dirty-brown.

Erythrophleina possesses very marked toxic properties, and must be placed amongst those poisons which act upon the heart.

Two milligrams injected under the skin of a frog's foot caused the cessation of the heart's action in five to eight minutes. The ventricles cease in systole, the auricles generally in diastole. The cessation of the cardiac muscle is succeeded by a torpor of all the muscles, during which death occurs. The double salt with platinic chloride produces the same effect as the base itself.

Atropia does not rally the action of the heart paralyzed by erythrophleina, but curare delays the effects.

E. Couminga is a variety resembling *E. guineense*. All parts of it are poisonous, and the poison consists of an alkaloid, of which the physiological effects are similar to those of erythrophleina.—C. H. P. in *Jour. Chem. Soc.*, Nov., 1876, from *Bull. Soc. Chim.* [2], ccxxi, 39-40.

VARIETIES.

Student Life in Germany. BY FREDERICK B. POWER.—The thought occurred to the writer that a glimpse of student life in Germany might not be entirely devoid of interest to some American students or Pharmacists, and more especially in relation to those studies pursued by Pharmacists in the departments of science of the German Universities.

The German University, as is generally known, is wider in its scope than many American Colleges and Universities, and adopts a method of instruction diverging considerably from the more general collegiate curriculum; it also finds such earnest recognition from the fact of its liberality, the student not being compelled to gain his information from prescribed text books, or to follow a contracted and mechanical course of study, but such studies as he may wish to pursue may be selected by him at his option. The University year is divided into two semesters of about five months each, the winter semester beginning the latter part of October and ending the latter part of March; the summer semester beginning about the middle of April and ending about the middle of August, a short vacation being allowed at the Easter season and a vacation of two months during the summer.

The Faculties as a rule embrace Theology, Law and Political Science, Philosophy, Medicine, Mathematics and the Natural Sciences. In the latter department may be found almost exclusively those branches of special interest to the Pharmacist and Chemist, with the exception of a few of indirect importance, which are included in the Faculty of Medicine and treated more in relation to the requirements of medical science, such as Toxicology, Pharmacology, Physiological and Pathological Chemistry.

The Mathematical and Natural Science Faculty embraces theoretical and practical Chemistry, Pharmacognosy, Botany, Mineralogy, Physics, Geology, Zoology, Palæophytology, Palæontology and the higher branches of Mathematics.

From this somewhat extended list such may be selected as may meet the requirements of individual purposes and needs, and it not unfrequently occurs that the students change from one University to another, to study in some special department where the Professor, through original investigation and research in the field of discovery, has acquired greater celebrity.

The *Vorlesungen*, readings or lectures by the Professors, take place at different hours of the day, and are so arranged in the respective faculties that the attendance of one may not preclude the attendance of another, beginning at 8 or 9 in the morning, are followed by other Professors at intervals throughout the day until 6 or 8 in the evening; the time intervening between lecture hours being employed by the students in Laboratory work.

The Laboratories, although differing in size and elegance of appointments, according to the wealth and position maintained by the respective Universities, are generally well supplied with all the conveniences and accessories for the execution of practical work and investigation in the several domains of science.

The Libraries which form a vast storehouse of knowledge, as also the reading rooms, where may be found all the current scientific literature, are also accessible to the students upon the payment of a small sum.

The students are comprised not only of those who still retain a vivid recollection of the ordeal of a German *Gymnasium* examination, but also of many upon whom the hand of time has made its impress. They are also, as a class, not possessed of unlimited means, and are therefore necessarily confined to the plainer modes of life. Their quarters are often to be found in the fifth story, at which elevation the rooms are the cheapest, and from which a song has originated entitled, *Fünf Treppen hoch*. The furniture of these rooms may consist of a writing table, chair, student lamp, and perhaps adorning the wall one or more capacious pipes.

Upon entering the University buildings, may be observed a black-board, where official and other announcements of general information to the students are from time to time made known, such as changes in the hours appointed for lectures, etc. There also may usually be seen a placard announcing the location of the *Fechtboden*, or fencing room, and where fencing implements may be obtained. This feature, which has become an almost historical characteristic of the German University, is happily on the decline, being with a few exceptions less frequently indulged in than in former years, although students may still be seen who carry the scars caused by the deep gashes of the sabre, and which are often considered as

emblematical of high honor, from the resentment of some often imaginary injury or feeling of wounded pride.

There being no class recitations as in many American Colleges and Universities, the Professors are much less restricted, and able to devote much more time to independent study; the developments of which are soon communicated to the students. As might be expected from their position, the Professors are usually indefatigable workers and searchers after truth in the explorations of their favorite and special departments of science; and it is indeed only upon this basis that they meet with official recognition by the Government or the University. That the German Universities, as a class, are extended in their scope and high in their standard and aim is a fact which has long since met with universal recognition, and is verified by their attendance by students from almost every part of the civilized world; in the words of Heinrich von Seybel (a leading Professor at Bonn), "they are workshops of science and not mere institutions where instruction is given." They offer to the student a wide field for independent thought and development, and as it has been stated that they were in their prime in the time of Goethe, it certainly cannot be intimated that they have since declined, as the Prussian Government, fully realizing their importance, has extended to them every required support. That the German scientists have in the past and do still, through their labors, render inestimable service for the advancement of Pharmacy and allied sciences, is a fact so patent as to admit of no refutation, and one need but to look over the scientific literature of the past, and the unreceding current of the present, as distributed through the various journalistic exponents, to be assured of and appreciate its vast importance; and although it has been sometimes stated that the German scientific literature is impracticable and abstruse, it should be remembered that the divulgement of theoretical speculations often illumine the way which may lead to practical results, and their subsequent useful application in Medicine, Manufactures and the Arts, a most striking example of which may be observed in the history of the development of the coal tar colors and other artificial dyes, the results of much patient study and research, performed chiefly for the purpose of elucidating some scientific theories, with little preconception of the important part they were destined to play in the world's industry.

At the more important Universities there exists the *Akademische Pharmaceuten-Verein*, an organization of pharmaceutical and chemical students, for social intercourse and the discussion of scientific subjects, and which is inaugurated each year by a so-called *Antritts-Kneipe*, upon which occasion new members are accepted, the popular student songs are sung, short speeches made, and many other festivities peculiar to the time-honored customs of German students, and which indeed form an integral part of student life.

It is, however, an unfortunate fact that the number of pharmaceutical students throughout Germany has so perceptibly decreased within the past few years, although the number of votaries to strictly chemical science gradually increases; but this is hardly surprising in view of the fact of the prevailing tendencies in the direction of *free trade*, and the long preparatory course required by law, extending through a period of about 8 years, before a candidate can purchase an established Pharmacy or obtain a concession from the Government for the erection of a new one in such

a locality as may be considered necessary. With the future of Pharmacy in Germany thus clouded, it is quite natural that its would-be devotees seek more lucrative and promising fields of labor.

However, while students of Philosophy, Medicine and Political Science are year after year migrating to German shores, it would be highly gratifying to see some representatives among the American Pharmacists, and while not detracting from the support due to home educational institutions or the high position attained by some American Colleges of Pharmacy, through the faithful teaching and untiring industry of their Professors, the student is thus but the better prepared, and possesses but the needed qualifications for the further pursuit of such studies, and the more closely allied collateral sciences, thus giving a stimulus to a spirit of advancement and research which, it might be hoped, in connection with the Colleges of Pharmacy and various local organizations, would be productive of a still higher status of American Pharmacy, when the empiricism shall be exposed and suppressed, and yield to the requirements of true science; when the Pharmacist shall no longer be looked upon as a mere tradesman or the acceptance of the vocation simply as a means toward the attainment of selfish ends, but that it may meet with its proper recognition by the people, as standing on a level with the professions of Medicine or of Law, and having a just claim on their protection, and although in its nature in a degree subservient to the demands of Medicine, so also is Medicine indebted to and dependent upon Pharmacy and Chemistry for many of the remedies daily employed. The often assumed position of antagonism between members of the two professions as to the right of prerogative or claim of superiority from the standpoint of social position and influence on the part of either, cannot be otherwise than detrimental to the highest interests of both, and the too-frequently manifested spirit of animosity should be supplanted by the dictates of truer reason.

In conclusion, the writer would call the attention of those who may feel interested upon the subject of German Universities in their various relations to the work of Jas. Morgan Hart, entitled "German Universities," as also a series of highly interesting articles by the same author, in "Lippincott's Magazine," vol. xvii, and would also further extend the assurance that American students who cross the seas in the pursuit of knowledge, will ever meet with a welcome reception at the hands of their German co-workers.

Strassburg, November, 1876.

Castile Soap and its Counterfeits.—There are four descriptions of imported Castile soap known in the American market. First, and at the head of the list in reputation is the Italian white Castile, known as the Conti soap. The jobbing price of this at present ranges from sixteen to sixteen and a half cents currency. It is claimed that oil only is used instead of fat in its manufacture, either olive oil that is left after the best is bottled, or sometimes cocoa-nut oil. The next brand in reputation, and said to be equal in quality and healing properties, is the "white horse," also a white soap, imported from Marseilles. This at present is selling at twelve to twelve and a half cents. These two brands, it is said, are never counterfeited here, and are stated to be free from all adulteration. Tests made by us have failed to show any adulteration or addition of substances to add to the weight, as is the case in mottled soaps. These white soaps come in boxes of thirty-five to thirty-seven pounds gross weight, and a tare of four pounds is allowed. Next come the Marseilles and the Leghorn mottled, the former claimed to be the better of the two. The importation of these soaps is rapidly falling off, owing to the competition of the domestic article, which as a rule is asserted to be the best and purest. In mak-

300,000 francs = 120000000

ing the Castile soap olive or cocoa-nut oil is supposed to be the material used, and this gives it its healing properties. Of late years, however, other and cheaper oils are said to have been substituted, such as linseed and cotton seed oil, but the fact of the latter being used can be detected, it is claimed by experts, from the darker color of the soap. Within the past five years, in order to meet the competition of buyers, it has become the custom to adulterate both Marseilles and Leghorn mottled soap with terra alba or chalk. Some samples which we have seen tested show thirty-five per cent. of this substance added to increase the weight and cheapen the article. There is, of course, some of the genuine article imported, but a buyer had better depend on the reputation of his wholesale dealers, and even then they may possibly be imposed upon. These soaps come in boxes of forty-five to forty-seven pounds, and a tare of eight pounds is allowed. The loss in weight on Castile soap is very large, according to the length of time it is carried, the loss in four or five months being as much in some cases as twenty per cent. When sold it is re-weighed, and by some dealers the actual tare at the time of sale is allowed, and by some the original tare, but the price is advanced accordingly, the price having to be made so much higher to meet the loss in weight. This mottled soap is also largely made here. Boxes are shipped here from Marseilles in the form of shoos and put together here. These boxes, when put in the market, often bear all the marks of imported soap. The soft and wet appearance of the soap is no guide as to whether it is foreign or domestic, as the former often reaches here in that state, and soap containing a large proportion of water to increase the weight, but it should be made in bars, and not look as if cut with a wire.—*Jour. App. Sci.*, [Lond.], Dec. 1, 1876, from *American Grocer*.

The Manufacture of Milk Sugar in Switzerland.—By A. SAUTER.—In a communication to the "*Schweizerische Wochenschrift für Pharmacie*," for the 20th of October, the author gives an account of a visit to Marbach, in the canton of Luzerne, Switzerland, where half a dozen refiners are said to make a handsome income from the manufacture of milk sugar.

The raw material used for the recrystallization comes from the neighboring Alps, in the cantons of Luzerne, Bern, Schwyz, etc.; a considerable quantity is supplied also by Gruyères. It is the so-called "Schottensand," or "Zuckersand," the French "*Déchet de lait*," obtained by simple evaporation of the whey after cheese-making. Notwithstanding a continual rise in the price, consequent upon the demand and the increased cost of labor and fuel, the manufacture continually expands, and now amounts to 1,800 to 2,000 cwts. yearly, corresponding to a gross value of about 300,000 francs—certainly a handsome sum for a small mountain village, with but few inhabitants.

The manufacture is only carried on in the higher mountains, because there the material can no longer be used profitably for the fattening of swine, which are found chiefly in the valleys, and the wood required for the evaporating process is cheaper in the highlands.

The crude material is sent to the manufacturer or refiner in sacks containing one to two hundredweights. It is washed in copper vessels, and dissolved to saturation at the boiling temperature over a fire, and the yellow brown liquor, after straining, is allowed to stand in copper-lined tubs or long troughs to crystallize. The sugar crystals form in clusters on immersed chips of wood, and these are the most pure, and therefore of rather greater commercial value than the milk sugar in plates, which is deposited on the sides of the vessels.

In ten to fourteen days the process of crystallization has ended, and the milk sugar has finished growing (*ausgewachsen*). The crystals are then washed with cold water, afterwards dried in a cauldron over a fire, and packed in casks holding four to five hundredweights.

As the "Schottensand" can only be obtained in the summer, the recrystallization is not carried on in the winter, hence a popular saying that the milk sugar does not "grow" in the winter. The entire manipulation is carried on in a very primi-

tive manner, it being a matter of astonishment to find a specific gravity instrument in any place. The author is of opinion that with a more rational method of working, a whiter and finer quality sugar could be produced.—*Pharm. Journ. and Trans.*, Nov. 11th, 1876.

Ipecacuanha and Vanilla Cultivation in India.—The following notes on the cultivation of vanilla and ipecacuanha in India we gather from Dr. King's recently received report on the Calcutta Botanic Gardens. With reference to the former, Dr. King says: "Some very sanguine forecasts having been made of the future of vanilla cultivation in Bengal, a number of plants were, two years ago, put out in the Calcutta Garden under sheds similar to those in which the pepper vine is grown. The growth of these plants has not been satisfactory, probably from over-shading; many have, therefore, been recently put under the shade of mango-trees. The finest old vanilla plants in the Garden grow against a north wall. One of these was this year laden with pods, but an unusually high temperature for a day or two caused them to drop prematurely. Recent, as well as former experience, leads me to think that vanilla will never become a staple product in Bengal." With regard to ipecacuanha, quantities of plants, it seems, "have been sent to Ceylon, to the Neilgherries (for trial at Barliar, a garden in a hot, low valley below Coonoor) and to Burmah. It is to be hoped that a locality may soon be found where this invaluable specific, for one of the worst of tropical diseases, can be profitably grown as a crop. I fear it cannot be thus grown so far north as Bengal. The secret of successful propagation being now perfectly understood, any number of plants can be sent out. During the year I supplied a quantity of the drug itself (the dried root) to the Surgeon-General for trial in hospital practice. This was carefully administered in cases of dysentery by Dr. Crombie, late officiating physician to the Medical College Hospital, and was pronounced by him to be quite as efficient as the best South American drug.—*Pharm. Journ. and Trans.*, Nov. 25th, 1876.

Almén's Test for Blood.—T. Schiellerup (Copenhagen) calls attention to the so-called Almén's test, and warns against its use as being TOO DELICATE—one twenty-thousandth part of a milligram of iron (as chloride) being sufficient to produce the reaction. The test is as follows: A few cubic centimetres of tincture of guaiacum and an equal quantity of oil of turpentine are put into a test-tube and a little of the suspected liquid (urine, etc.) added, when, in the presence of blood, an intense blue color is immediately produced; dried stains are extracted with diluted acetic acid (*Proceedings Amer. Phar. Asso.*, 1875, p. 465). If one considers that iron is almost universally found, and that the reaction, as before mentioned, is so extremely delicate, it becomes evident that this test is a dangerous one in legal cases.

Mr. S. remarks incidentally that this test originated some fifteen years ago with Prof. Van Deen, Holland.—*H. M. W. from Ny Pharm. Tidsskrift*, 1876, p. 353.

MINUTES OF THE COLLEGE.

PHILADELPHIA, Twelfth mo. 25th, 1876.

Pursuant to the usual notice, the following members of the Philadelphia College of Pharmacy assembled at the College hall, No. 145 N. Tenth street, viz.:

Dillwyn Parrish, President; William C. Bakes and William J. Jenks.

There being no quorum in attendance, it was agreed to adjourn to meet to-morrow, the 26th inst., at 3.30 P.M.

WILLIAM J. JENKS, *Secretary*.

PHILADELPHIA, Twelfth mo. 26th, 1876.

An adjourned meeting of the Philadelphia College of Pharmacy was held this day at the College hall, No. 145 N. Tenth street. Dillwyn Parrish, President, in the chair, and twelve members in attendance.

The minutes of the last meeting were read and adopted. Those of the Board of Trustees were also read, and on motion adopted.

The Secretary reported that the resolution of thanks, directed by the College last month to be sent to Messrs. F. C. Calvert & Co., of Manchester, England, had been engrossed and forwarded to them as requested.

Mr. Bullock, Treasurer of the Committee on Centennial Purchases, reported through Mr. Wiegand that he would have remaining a small sum of money, and requested the College to direct the amount to be returned to the Treasurer of the College, which request was acquiesced in and the motion agreed to.

Mr. McIntyre, Registrar of the Pharmaceutical Meetings, stated that he had sent out notices and invitations to others interested in pharmaceutical science beside the members of the College, to attend such meetings, and desired to know if his course was approved.

It being the general opinion that it was desirable to have a full attendance of all who might take an interest in pharmacy it was, on motion,

Resolved, That we recognize the invitations sent out by the Registrar as being strictly within the intention of the College in instituting the Pharmaceutical Meetings.

Mr. Boring stated that the meetings of the Alumni Association had been generally held in the College, and desired to know if the continuance of this practice was acceptable to members, which, meeting with an affirmative response, it was, on motion,

Resolved, That the Alumni Association of the College be invited to hold such meetings as they may desire in the College building.

Professor Remington presented an original portrait in oil of the late William Redwood Fisher, Professor of Chemistry in this College in 1841-42. This portrait was given to the College by Mrs. William J. Geen of this city, through the interposition of Professor Joseph Carson, who was Professor of Materia Medica in the College at the same time.

The portrait is a valuable one, and completes the line of pictures of the Professors from the foundation of the College to the present time.

On motion of Mr. Bakes, the Hall Committee were directed to have the portrait framed in accordance with the others, and hung in its place in the Hall of the College.

On motion of Professor Remington the thanks of the College were directed to be presented to Mrs. Geen for the acceptable gift, and also to Professor Joseph Carson for the interest he has taken in the College in connection therewith.

There being no further business, on motion, adjourned.

WILLIAM J. JENKS, *Secretary.*

MINUTES OF THE PHARMACEUTICAL MEETING.

The third meeting of the session was held December 19th, 1876, Dillwyn Parrish in the chair. The minutes of the previous meeting were read and approved. Donations to the library: "The Chemists' and Druggists' Diary," 1877, London, from the publishers; the "Greek Pharmacopœia," from Prof. X. Landerer, of Athens; to the Cabinet: Maté or Paraguay tea, in original packages, from Alonzo Robbins.

R. V. Mattison read a paper on Diluted Phosphoric Acid (see page 8), claiming for his process rapidity and safety in execution, no special apparatus being required, and it being not expensive in a small way.

Dr. Pile thought the process, with bromine in solution, all that could be desired in simplicity, requiring no watching, but merely some time; the troublesome part with both processes is the evaporation of the nitric acid. For this a low temperature will not suffice, a heat of 340° to 350° F. being required, and afterwards care not to dilute until cold. A much higher temperature will dissolve the enamel of the Berlin capsules, which will be partly precipitated upon the addition of water. Prof. Maisch remarked that the determination of neutralization by means of litmus was very unsatisfactory, since the litmus solution changed its color very gradually.

Prof. Maisch read a paper by L. Wolff, of Philadelphia, on the use of Petroleum Benzin in Pharmacy (see page 1). He regarded this as a very interesting subject, and one which was by no means exhausted. Some time since (*"Am. Jour. Ph.,"* 1872, p. 134), he had presented to this meeting styracin made of the use of petroleum benzin, and other observers had born testimony to its manifold uses. Wm. L. Harrison (*"Am. Jour. Phar.,"* 1874, p. 161), found in it an easy and cheap way of obtaining cinnamic acid, besides styracin, and Wallace Procter had separated with it a white crystalline substance from *Magnolia tripetala* (*Ibid.*, 1872, p. 146). It is an excellent solvent for monobromated camphor and other crystalline bodies, and affords a ready means of obtaining them in good crystallizations.

Prof. Remington said that an odor of kerosene might remain in such preparations from the employment of a petroleum benzin which had not been carefully rectified.

Dr. Pile, in preparing some oleoresins, had used the kind known as gasolin, and did not find any odor remaining.

Prof. Maisch exhibited quinine flower, so-called (*"Am. Jour. Ph.,"* 1876, p. 454); from experiments made by Mr. Th. F. Beckert, it is possible that it may contain an alkaloid; if so, it would be the first found in the *Gentianacæ*. Mr. Beckert observed that the tincture evaporated, thrown into water slightly acidulated and filtered, would yield a slight precipitate with Mayer's solution.

Dr. J. Dabney Palmer, of Monticello, Fla., had sent the quinine flower and its tincture; also tincture and fluid extract of Buttonwood (*Cephalanthus occidentalis*) and tincture of *Sarracenia flava* or Trumpet plant, which appear to be employed medicinally in that section of the country.

Prof. Remington had upon the table for inspection from the Centennial Exhibition an interesting collection; from A. Beslier, Paris, Pharmaceutical preparations and a large mounted specimen of *Thapsia Garganica*; from Joseph Bosisto, Victoria, Eucalyptus products and Australian pharmaceutical preparations; from Mr. Brugsch, Egyptian Commissioner, Egyptian Drugs, Pharmaceutical preparations, etc.; purchased by the College from Behn Meyer & Co., of Singapore, a large collection of raw products of that region. A detailed account of these acquisitions will appear in the Curator's report, to be read at the annual meeting of the College.

WILLIAM MCINTYRE, Registrar.

PHARMACEUTICAL COLLEGES AND ASSOCIATIONS.

The Richmond Pharmaceutical Association held its annual meeting on the evening of December 12th, Dr. John R. Garnett in the chair, Mr. Jos. N. Willis, Secretary. Mr. Hugh Blair reported on the operations of the Society during the past year, and made some valuable suggestions relating to its future welfare and usefulness. Reports were also received from the Recording Secretary, Mr. Jos. Anthony, and the treasurer, Mr. B. C. Lewis.

The election of officers for the ensuing year resulted as follows: President, Hugh Blair; First Vice-President, Joseph N. Willis; Second Vice-President, P. E. Dupuy; Recording Secretary, Joseph Anthony; Corresponding Secretary, T. Roberts Baker. Executive Committee: Wm. P. Poythress, Polk Miller, Jesse Child.

The Camden County Pharmaceutical Association held its third annual meeting Nov. 24th, President Jas. A. Armstrong in the chair.

Reports from the Secretary and Treasurer showed the Society to be in a flattering condition.

The President's annual address contained a short history of all the pharmaceutical stores in Camden, which was very interesting.

The following officers were elected for the ensuing year: President, D. P. Pan-coast, M. D. Vice-President, M. Goldsmith. Secretary, Emmor H. Lee, Ph. G. Treasurer, L. M. Pratt, M. D. Librarian, O. G. Taylor. Library Committee—S. W. Cochran, F. G. Thoman, Herman W. Miller.

Alumni Association of the Philadelphia College of Pharmacy.—At the monthly meeting held December 7th, 1876, President Kennedy in the chair, 33 members and students were present. Messrs. Boring, Miller and Procter each presented 10 specimens of officinal drugs and preparations for the consideration of the students, who manifested a lively interest in their examination.

Dr. Miller remarked on the adulteration of wax, as practised in commerce, mentioning one lot in which it reached 75 per cent. He submitted mixtures of wax, paraffin, Japan wax and stearin, seven in number, in which two or more of these were combined. That of paraffin and wax seemed to be the most dangerous imitation.

President Kennedy read a paper on *Aquæ Medicatæ* of the "*Pharmacopœia*" (see page 7).

Mr. N. A. Kuhn, of the Class of 76-77, read a paper on oil of Ceylon cinnamon leaves (see page 12), in reply to a query accepted by him at the last meeting.

A communication from Prof. Remington in reference to Alpha Phi Society of the Philadelphia College of Pharmacy was read. He stated that the society was formed by the first course students to assist them in preparing for a junior examination, which was recommended by the convention of teaching colleges. The members of the society were invited to attend the future monthly meetings of the association.

Mr. Boring stated that he had great difficulty in procuring colchicum root of a quality answering the prescribed conditions. Careful garbling giving but 3½ ounces of white root from a pound of a handsome looking specimen.

President Kennedy alluded to the change to a light orange color of a carefully kept specimen of *Lautier Fils'* orange flower water, no other deterioration being noticed.

Dr. Miller spoke of the fine quality of the "*Matières Premières*" shown by this firm at the Exhibition. In referring to the adulteration of food, poisonous coloring matters were mentioned which were constantly sold to confectioners, such as chrome yellow and even Paris green. He suggested, as the best means of avoiding the use of these, that good practical formulas should be made known through the journals, so that apothecaries generally could prepare them on demand. As a thesis subject it gives a wide field of research, and even a single good color obtained would be an important advantage to the health of the community.

After some reference to irregular prescriptions, and to other subjects of minor importance, the association adjourned until January 4th.

WALLACE PROCTER, *Secretary*.

EDITORIAL DEPARTMENT.

The Journal.—The present number appears with a few typographical changes, among which the type selected for the various headings will be found to be more serviceable and useful than that hitherto employed.

The new volume opens with a gratifying number of original articles, and among the contributors we are pleased to welcome not only several whose names are not unfamiliar to our readers, but also others who offer their observations for the first time directly to our readers. In examining the various original papers, it will be observed that the majority have a direct practical bearing upon manipulations and processes in almost daily use in the store and laboratory, and are suggestive of further extended applications. Scientific subjects, of interest to pharmacists, are discussed in two papers, and in another a hygienic question of general importance receives proper attention. Of similar interest and import, direct or suggestive, will be found the various essays which have been selected from our cotemporaries, and appear in the present number, either unabridged or in a condensed form.

In thanking the numerous contributors to the present and the past issues of the JOURNAL, we would, at the same time, request all our readers to take notes of their observations with the various officinal and unofficinal processes, of improvements in apparatus and manipulations, of unexpected reactions, in short, of every occurrence that may possess or appear to possess some interest, and communicate the same to the editor, with the view of laying them before our readers.

In this connection, we desire also to call the attention of our friends to the advertisement of the Publishing Committee in relation to back volumes of the JOURNAL. It will be observed that a considerable reduction has been made for many of the volumes and single numbers, and many will doubtless find it to their advantage to complete, to some extent, their sets at the low price at which they are offered. By the use of the excellent Index, prepared by Mr. H. M. Wilder, for the first forty-two volumes, all the material contained therein becomes readily available. It is stated by the committee that many of the volumes and numbers thus offered are in stock to a limited extent only, so that the offers now made are likely to be withdrawn as the stock is diminished.

Hydrobromic Acid.—In some papers by Dr. J. Milner Fothergill, originally published in the "British Medical Journal," and recently reproduced by several medical journals in this country, attention is drawn to the medicinal properties of hydrobromic acid and to a formula for its preparation, which originated with Dr. Dewitt C. Wade, and appeared in the "Peninsular Medical Journal" for February, 1875. The formula directs to dissolve $\mathfrak{z}\text{x}$ $\mathfrak{z}\text{vi}$ gr. xxviii of bromide of potassium in four pints of water, and add $\mathfrak{z}\text{xiii}$ $\mathfrak{z}\text{i}$ gr. xxxvii of tartaric acid; bitartrate of potassium is produced, the greater part of which crystallizes out, and a solution of hydrobromic acid in water, containing also some potassium bitartrate, is left.

Although various processes for the preparation of hydrobromic acid directly from bromine have been published in former volumes of this journal and in other publications, the necessity of adopting various precautions to avoid accidents in consequence of possible violent reactions seems to speak in favor of a simpler process, which can readily be followed even by the unexperienced, and though the acid thus obtained may not be chemically pure; and such is the one recommended by Dr. Wade.

By calculation from the molecular weights, it will be found that the potassium bromide is slightly in excess, which is perhaps rather an advantage. But a considerable difference in the strength of the hydrobromic acid will be found, as the weights and measures of the British or United States "Pharmacopœia" are used. With the former, the hydrobromic acid obtainable from 4731 grains potassium bromide will be contained in 80 fluidounces imperial measure (Oiv Imp. Meas. = $76\frac{1}{2}$ $\mathfrak{f}\mathfrak{z}$ U. S.), which gives 401 gr. HBr to the fluidounce. Operating with the weights and measures as employed in this country 3531 grs. HBr, obtainable from 5188 grs. KBr, will be contained in 64 fluidounces, or $55\frac{1}{2}$ grs. per $\mathfrak{f}\mathfrak{z}\text{i}$. In these calculations the increase in bulk from dissolved compounds has been disregarded.

The last figure gives probably the strength which is intended; but by a slight modification of the weights a much more convenient formula will be obtained, since the weights can be accurately reduced to a single fluidounce. We propose therefore to take

f3i	water, 80 grains . .	potassium bromide, 100 grains . .	tartaric acid,
Oi	" 2 troyoz. 320 grs. "	" 3 troyoz. 160 grs. "	" "
Oiv	" 10 " 320 grs. "	" 13 " 160 " "	" "

The bromide should be dissolved in three-fourths of the water and the tartaric acid in the other fourth; after mixing the solutions well, it will be found advantageous to expose the mixture for some time to a temperature of about 32° F, and allow the greater portion of the cream of tartar to crystallize out. With the above proportions there will still be a slight excess of potassium bromide, and the preparation will be equal in strength to that obtained by Dr. Wade's formula. It is scarcely necessary to remark that the cream of tartar thus obtained, after having been washed with cold water, is very pure and may be utilized.

Our readers are aware that in the preparation of monobromated camphor (see "Amer. Jour. Phar.," 1872, p. 337) one-half the bromine used is converted into hydrobromic acid and may be obtained without trouble by passing the gas into water.

REVIEWS AND BIBLIOGRAPHICAL NOTICES.

The Popular Health Almanac for 1877. Edited by Frederick Hoffmann. New York: E. Steiger.

A year ago we had the pleasure of noticing the first issue of this publication; it entered upon its mission with the praiseworthy object, to furnish useful information on matters of health, and we believe that it has fulfilled its mission creditably. That it has met with favor, wherever it became known, is evidenced by the issue now before us, which in every respect fulfills the expectation formed on perusing the former, and we hope that it may find its way into the home of every family, for each will find in it information useful for every member.

The health articles are on the subjects of hygiene, water supplies, cleanliness and bathing, furnace-heating, care of the teeth, first help in accidents and emergencies, first treatment and antidotes for poisons, nostrums and their composition, and statistics of mortality. Besides these, various other articles and notes aim to impart useful knowledge, among them tables comparing the metric with the common weights and measures. An appendix contains an acceptable *Kindergarten* tract, and some instructive information on the use of salicylic acid in the household; the latter found its way here evidently as an advertisement, and we cannot therefore hold the editor responsible for information belonging in a medical treatise rather than in a popular health guide, like the directions for the use of salicylic acid in diphtheria, acute rheumatism, epidemic fevers, etc.

The almanac deserves the hearty support of physicians and pharmacists, both being particularly interested in its widest distribution.

Pharmacological Dictionary, a Lexicon of Pharmaceutical Terminology; containing all the Terms of the "Pharmacopœias" of the United States and Germany, in English, German and Latin, with all Popular Dialectic or Provincial German Names of Drugs, Herbs, Medicines, Preparations, Concoctions, Decoctions, Infusions, and their English Synonyms, Alphabetically arranged. For the use of Druggists, Physicians, Chemists, Students, and the German-American Public.

By Dr. Robt. Karl Beer. Baltimore, 1876: Beer & Sadler. 16mo, pp. 80. Bound; price, \$1.50.

The lengthy title of this little volume explains the aims the author had in view in preparing it. In the first place, it was intended—so the preface informs us—to be used by physicians who, with the author, are reading German medical works in the original; it was natural to endeavor to make it useful and acceptable also to a larger circle.

The first and smaller portion is the English-German part, containing the English and Latin names of the U. S. "Pharmacopœia," with their German synonyms. In this, unnecessary repetitions have been very judiciously avoided; thus infusions, tinctures, etc., are given only by their English names, without repeating them again under Infusum, Tinctura, etc.

The second, or German-English part comprises nearly two-thirds of the whole, and does not contain the Latin terms as official in Germany, except occasionally as the equivalent of the German word, in which connection it should have been replaced either by the English synonym or by the Latin term as employed in our "Pharmacopœia." On the whole, however, these will not occasion much inconvenience; but for some of the Latin terms employed in this part we should have preferred the proper English term, if known here, or the full botanical name; thus, instead of *radix hydrolapathi*, root of *Rumex aquaticus* would have been clearer to the great majority of American pharmacists.

We believe the little work to be useful to all those classes enumerated in the title in their intercourse with the German-speaking population, and in reading pharmaceutical works in the German language, and as such recommend it to our readers.

The Chemists' and Druggists' Diary, 1877. Published at the office of the "Chemist and Druggist," London.

This annual publication contains a large number of formulas and recipes, old and new, collected from various sources and embracing pharmacy, medicine, perfumery, specialties, etc., also a great deal of information which is of special interest to the British pharmacist.

Medicinal Plants, being descriptions with original figures of the principal plants employed in medicine, and an account of their properties and uses. By Robert Bently, F.L.S. and Henry Trimen, M.B., F.L.S., etc. Philadelphia: Lindsay & Blakiston. Parts 9-12. Price, \$2.00 each.

The descriptions and plants contained in the four numbers before us comprise the following species: *Cissampelos pareira*, *Podophyllum peltatum*, *Cistus creticus*, *Geranium maculatum*, *Polygonum bistorta*, *Myristica fragrans*, *Curcuma longa*, *Vanilla planifolia*, *Viola odorata*, *Cinnamodendron corticosum*, *Krameria triandra* and *ixina*, *Toluifera Pereira*, *Tamarindus indica*, *Valeriana officinalis*, *Hyoscyamus niger*, *Jateorhiza calumba*, *Aegle marmelos*, *Picræna excelsa*, *Rhamnus frangula*, *Rubus villosus*, *Artemisia absinthium*, *Taxus baccata*, *Cochlearia armoracia*, *Trigonella foenum-græcum*, *Rosa gallica*, *Fraxinus ornus*, *Thymus vulgaris*, *Daphne mezereum* and *Pinus sylvestris*.

As heretofore, the plates are excellently executed in design and coloring, and the descriptive text is clear and reliable. Regarding the illustration of the Peru balsam tree, it may not be amiss to state that the figure of the fruit is a true representation of what was handed to us nearly fifteen years ago as the fruit of the tree from which Peru balsam is produced, and which may have come from Dr. Dorat, from whose specimens the figures were drawn; but we were unable to trace our specimens beyond the United States. At the late International Exposition the Mexican Society of Natural Sciences exhibited an extensive collection of drugs, among which were specimens of a fruit labeled *Myrospermum Pereira*, which, though agreeing in

general characters with that of the *Toluifera* figured, was markedly distinct from it by being much shorter and nearly orbicular-oblong. The Mexican Catalogue stated that the tree grows in warm and damp places in the State of Morelos and other parts of Mexico, and that its fruit and bark are employed as balsamic stimulants and in the preparation of a dye. Though Peru balsam was also exhibited, we could not ascertain whether it had been really produced from the species or variety yielding the fruit described.

OBITUARY.

CRISTIAN EDWARD EYSTER died in Duluth, Minn., Nov. 13th, aged 29 years. He entered the drug business in 1865 in his native town, Chambersburg, Pa., and graduated at the Philadelphia College of Pharmacy, 1869. In 1870, he embarked in business in Duluth, where he continued until the date of his death. His social qualities, upright and enterprising business career and uniform Christian life render his untimely death a sad affliction to his family and a loss to the business he so creditably represented.

CATALOGUE

OF THE

Class of the Philadelphia College of Pharmacy,

FOR THE FIFTY-SIXTH SESSION, 1876-7.

With a List of their Preceptors and Localities.

<i>Matriculants.</i>	<i>Town or County.</i>	<i>State.</i>	<i>Preceptor.</i>
Albrecht, Antonius Carl,	Philadelphia,	Pa.	Van Buskirk & Apple.
Albright, Franklin Pierce,	Allentown,	Pa.	B. N. Bethel.
Allen, Jno. Hays, Jr.,	Montoursville,	Pa.	James Kemble.
Allen, Jno. Reese,	Wilmington,	Del.	G. W. Notson.
Ancker, Louis,	Charleston,	S. C.	J. B. Shaw.
Angier, James Watson,	Darby,	Pa.	T. C. Weatherly.
Appenzeller, Gustav Adolph,	Carlsruhe,	Germany.	Cawthorn & Coleman.
Ashe, Cincie Braxton,	Selma,	Ala.	Bullock & Crenshaw.
Bache, Benjamin Franklin,	Bristol,	Pa.	J. L. Patterson & Bro.
Ball, William Amos,	Youngstown,	Ohio.	C. H. Seary.
Barnard, Geo. Luther,	Ashland,	Pa.	E. P. Camp.
Barr, Samuel Earnest,	Mt. Vernon,	Ohio.	G. E. Musselman.
Barnitz, Jno. Stevenson,	Chambersburg,	Pa.	W. W. Moorhead.
Barton, Charles Edwin,	Mansfield,	Ohio.	P. M. Ziegler.
Baume, Franklin Derr,	Reading,	Pa.	Edward Beale, M.D.
Beale, Charles,	Philadelphia,	Pa.	J. F. Caldwell.
Beckert, Theodore Frederick,	Pittsburg,	Pa.	S. S. Bunting.
Beetem, Jacob Samuel,	Carlisle,	Pa.	G. W. Dougherty.
Beitermann, William Wallace,	Hamburg,	Pa.	W. Notson, M.D.
Bellows, Charles Edward,	Bridgeton,	N. J.	F. S. Hilliard.
Bennett, M. Knight,	Vincentown,	N. J.	C. P. Squire & Co.
Betz, Herman,	Burlington,	Iowa.	
Biddle, Richard,	Philadelphia,	Pa.	M. J. Bissell.
Bissell, Emery Gilbert,	Waterville,	N. Y.	V. H. Smith & Co.
Bobb, Wallace Geary,	Philadelphia,	Pa.	G. B. Loomis.
Bossett, William Cowper,	Philadelphia,	Pa.	Wharton & Co.
Bowman, Charles Alexander,	Nashville,	Tenn.	W. K. Mattern.
Boyer, Edward Dayton,	Catasauqua,	Pa.	E. B. Garrigues & Co.
Brennecke, Robert Henry,	Watertown,	Wis.	Lancaster Bros.
Brown, David Howell,	Middletown,	N. Y.	A. L. Helmbold.
Brown, George Walbridge,	Jamestown,	N. Y.	Jno. Wyeth & Bro.
Brown, Thomas Trew,	Chestertown,	Md.	

<i>Matriculants.</i>	<i>Town or County.</i>	<i>State.</i>	<i>Preceptor.</i>
Brunner, Norman Isaac,	Macon,	Ga.	S. D. Everett.
Buchanan, Andrew,	Chester,	Pa.	M. H. Bickley.
Burns, Seymour S.,	Minersville,	Pa.	Bowen & Burns.
Burroughs, Silas Mainville,	Medina,	N. Y.	E. P. Healy, M.D.
Busch, Wm. Charles Asmus,	Davenport	Iowa.	Henry Ditzen
Byerly, Charles Henry,	Lock Haven,	Pa.	Mort. H. Eayere, Ph.G.
Chabot, Wash. Jackson,	Philadelphia,	Pa.	J. A. Millac.
Childs, Walter Foss.	Norristown,	Pa.	F. B. Poley. M.D.
Christman, Harry Warren,	Norristown,	Pa.	W. Stahler.
Cloud, Harlan,	Chester,	Pa.	W. B. Ulrich.
Conway, William Henry,	Philadelphia,	Pa.	Jos. P. Remington.
Correll, Cornelius,	Springfield,	Ill.	L. S. Correll.
Corrie, William,	Philadelphia,	Pa.	Peter Cruice.
Cox, Harry,	Philadelphia,	Pa.	W. E. Lee.
Cox, Harry Oscar,	Gloucester,	N. J.	D. W. Blake, M.D.
Coxey, Joseph Clarence,	Philadelphia,	Pa.	H. W. Miller.
Craig, Thomas Canby,	Chambersberg,	Pa.	C. H. Cressler.
Craighead, Thomas,	Philadelphia,	Pa.	George S. Craighead.
Crane, Henry Bedell,	Newton,	N. J.	H. H. Ross.
Crowl, Frank Mercer,	Oxford,	Pa.	George Cooke.
Curran, John Augustus,	Philadelphia,	Pa.	W. H. Pile.
Custus, Daniel Parke,	Tallahassee,	Fla.	
Davidson, Abraham,	Helmarshausen,	Germany.	H. L. v. Wittkamp, M.D.
Davis, Isaac,	Philadelphia,	Pa.	G. H. Davis.
Davis, Marshall Moses And.	Philadelphia,	Pa.	F. E. Himmelwright.
Davis, Nehemiah,	Smyrna,	Del.	John R. Haney, M.D.
Davis, Theodore Garrison,	Bridgeton,	N. J.	C. F. Dare.
Davy, George William,	Philadelphia,	Pa.	Bullock & Crenshaw.
Day, Wallace Melancthon,	Chicopee,	Mass.	Frank S. Dickinson.
Day, William George,	Hillsborough,	Md.	W. F. Fleming.
Dean, Norman R.,	Attleborough,	Pa.	Israel I. Grahame.
Dembinski, Louis,	Philadelphia,	Pa.	A. Oppermann.
Deprez, William Henry,	Shelbyville,	Ind.	John Weingarth.
DePuy, Caspar Edward,	Iowa Falls,	Iowa.	Foster & Hoag.
Dickeson, William Eunice,	Media,	Pa.	J. W. Dickeson, M.D.
Douglass, Samuel Milton,	Johnstown,	Pa.	C. T. Frazer.
Drancourt, Samuel,	Paris,	France.	Wyeth & Bro.
Driscoll, Edward William,	Philadelphia,	Pa.	J. D. Marshall & Bro.
Driver, Joseph Bingham,	Darlington,	Wis.	James Hillis.
Drueding, Charles Caspar,	Cloppenburg,	Germany.	Charles Bauer.
Drueding, Francis Fred.	Cloppenburg,	Germany.	George W. Eldridge.
Drueding, Henry Gerhard,	Cloppenburg,	Germany.	Luther Gerhard.
Elfreth, Jacob R.,	Philadelphia,	Pa.	W. H. Pile & Sons.
Evans, Albert,	Asbury,	N. J.	L. W. Adams.
Evans, J. Henry,	Philadelphia,	Pa.	W. D. Harrison.
Evans Henry William,	Danville,	Ky.	Samuel & Warner.
Ewing, George Washington,	Philadelphia,	Pa.	J. L. Bispham.
Falck, John Aiken,	Lancaster,	Pa.	Robert C. Sharp.
Fawkes, David Wilmot,	Wilmington,	Del.	E. Bringhurst & Co.
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Feil, Joseph,	Cleveland,	Ohio.	P. Fitch, M.D.
Fell, Theron Edwin,	Bloomington,	Ill.	A. L. Fox, M.D.
Fisher, Henry,	Philadelphia,	Pa.	Bullock & Crenshaw.
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Früh, Gustav Adolph,	Philadelphia,	Pa.	Carl D. S. Früh.
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Funk, Christian Lawson,	Hagerstown,	Md.	H. C. Blair's Sons.
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Gardner, Charles Herman,	Spruce Creek,	Pa.	Jos. P. Remington.
Garman, Samuel Franklin,	Lykens,	Pa.	Jonas Garman.
Gates, Burt Pike,	Saratoga,	N. Y.	Henry D. Jones.
Gerling, John Miller,	Cleveland,	Ohio.	Vaupel & Moore.
Gingrich, John Adam,	Lebanon,	Pa.	A. W. Bley.
Grahame, George Harris,	Philadelphia,	Pa.	Israel J. Grahame.
Gray, George Washington,	Philadelphia,	Pa.	Isaac Tull.
Graybill, Peter,	Annvile,	Pa.	D. G. A. Bachman.
Greig, George Horace,	Allegheny City,	Pa.	
Griffin, Louis Franklin,	Houston,	Texas.	John R. Angney.
Griffith, Albert Richard,	Oil City,	Pa.	
Goess, George Conrad, Jr.,	Philadelphia,	Pa.	P. H. Horn.
Groves, Freytag,	Philadelphia,	Pa.	M. F. Groves, M.D.
Hall, Harry Augustus,	Danville,	Ill.	W. F. Baum.
Hano, Simon Louis,	Philadelphia,	Pa.	H. B. Lippincott.
Harris, William,	Chester,	Pa.	Robert Howath.
Harrison, John Windham,	Wheeling,	W. V.	Logan, List & Co.
Hendricks, Elwood Gouldy,	Centre Point,	Pa.	W. K. Mattern.
Hewitt, Andrew Crawford,	Philadelphia,	Pa.	C. L. Eberle.

Matriculants.	Town or County.	State.	Preceptor.
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Hoguet, William,	Bristol,	Pa.	Louis Hoguet.
Holden, Chas. Vernon,	Bloomington,	Ill.	Ira Lackey.
Horne, James Walker,	Stratford,	Canada.	Henry Blithe.
Hubbard, Ph. Wadsworth,	Hiram,	Maine.	
Hudgin, Edward Lee,	Galesburg,	Ill.	Isaac V. Smith.
Hudson, Leonard Adkins,	Milford,	Del.	E. E. Hazlett.
Hughes, Thomas,	Richmond,	Ky.	J. P. Herndon.
Hurley, David George,	Lebanon,	Pa.	J. L. Lemberger.
Jarvis, Franklin Pierce,	Selma,	Ala.	Cawthorn & Coleman.
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Jones, Isaac Penrose,	Williamsport,	Pa.	L. A. Dix, M.D.
Kelley, Robert,	Philadelphia,	Pa.	Mellor & Rittenhouse.
Kern, James Picor,	Philadelphia,	Pa.	A. H. Yarnall & Co.
Kernan, Joseph Halbert,	Carlisle,	Pa.	T. J. Husband.
Kernan, Thos. Ed. Barron,	Philadelphia,	Pa.	McKelway & Borell.
Kilbride, John Jackson,	White Deer Mills,	Pa.	George J. Kilbride.
Killingbeck, Wm. John,	Camden,	N. J.	Wm. Trinder.
Kinports, John Henry,	Annvile,	Pa.	John E. Grove.
Kinports, Philip Stein,	Annvile,	Pa.	Clement B. Lowe.
Klopp, Eli Leinbach,	Stouchsburg,	Pa.	Samuel Gerhard.
Koehler, Walter Wm.,	Roxborough,	Pa.	Chas. E. Davis.
Kramer, Howard Samuel,	Allentown,	S. C.	T. A. Walker, Ph.G.
Kroeg, Andrew Alex.,	Charleston,	Pa.	A. M. Wilson.
Krout, Albert,	York,	Pa.	T. Y. Hoskinson.
Kuhn, Norman Archibald,	Salem,	Ohio.	R. P. Trimble.
Laciar, Henry Jacob,	Bethlehem,	Pa.	Lancaster Thomas.
Lamhofer, Edward,	Grand Island,	Neb.	D. Ackerman, Jr.
Landschutz, Peter,	Philadelphia,	Pa.	Jos. Landschutz.
Lardner, Wm. Sheppard,	Niles,	Mich.	Hansell & Bro.
Latham, Daniel Henry, Jr.,	Philadelphia,	Pa.	J. T. Walker, M.D.
Lehman, John Wesley,	Barren Hill,	Pa.	W. R. Warner.
Lerchen, Herman,	Davenport,	Iowa.	Gustave Schlegel.
Levering, George Washington,	Philadelphia,	Pa.	G. C. Davis.
Levering, Howard Malcom,	Philadelphia,	Pa.	Wm. C. Todd, M.D.
Lewis, Wm. Thompson,	Bridgeton,	N. J.	J. P. Bolton.
Lilly, Charles Foster,	York,	Pa.	Samuel Campbell.
Lindewald, Wilhelm Edward,	Stockholm,	Sweden.	
Llewellyn, John,	Johnstown,	Pa.	P. P. Fox, G.P.
Llewellyn, Wm. Henry,	Phoenixville,	Pa.	E. S. Stiney.
Lloyd, Evan Davis,	Pittsburgh,	Pa.	M. M. Schneider.
Lock, John Herman,	Philadelphia,	Pa.	L. W. Hildensband.
Longaker, Daniel,	Schwenksville,	Pa.	John Gilbert & Co.
Loper, Lorenzo Dow,	Bridgeton,	N. J.	H. A. Vogelbach.
Lustig, Emil,	Pittsburg,	Pa.	John G. Baker.
Lyneman, Felix Anthony,	Richmond,	Va.	
McKeehan, George Henry,	Chambersburg,	Pa.	L. H. A. Nickerson.
McMullin, Albert,	Philadelphia,	Pa.	A. M. Wilson.
McMullin, Andrew,	Philadelphia,	Pa.	W. H. Pile & Sons.
Mann, George Wagner,	Chester,	Pa.	W. Ranck, M.D.
Marley, Richard Cordeleon,	Newark,	De	
Martin, George, Jr.,	Philadelphia,	Pa.	A. H. Yarnall & Co.
Martin, John Albert,	Philadelphia,	Pa.	W. B. Abell.
Maulick, W. Frederick,	Marietta,	Pa.	George V. Eddy.
Merrick, Edwin Augustus,	Philadelphia,	Pa.	W. H. Pile & Sons.
Miller, David Patrick,	Lynchburg,	Va.	W. A. Strother.
Montgomery, J. Rushig,	Little Creek Landing,	Del.	R. H. D. Beart, M.D.
Moore, Frank,	North-East,	Md.	August Hohl.
Moore, Richard Jesse,	Springfield,	Ohio.	John Wyeth & Bro.
Morrison, Charlie,	Shelbyville,	Ind.	J. H. Leefers.
Moser, John Hendricks,	Norristown,	Pa.	A. R. Slemmer.
Mossberg, John Fred,	Carlstadt,	Sweden,	Samuel Campbell.
Murray, Bayard,	Philadelphia,	Pa.	R. Shoemaker & Co.
Musser, Omar Henry,	Lancaster,	Pa.	James T. Shinn.
Myers, Clayton Ricker,	Mount Joy,	Pa.	Thomas R. Coombe.
Myers, Edwin,	Philadelphia,	Pa.	John R. Stevenson.
Newbury, Grantham,	Northumberland,	Pa.	W. Weimar.
Newcome, Ed. Jacob,	Culpeper,	Va.	J. B. Gorrell.
Noss, Henry,	Norwich,	Conn.	M. F. W. Opperman.
Oleson, Olaf Martin,	Fort Dodge,	Iowa.	Prindle & Yount.
Orsell, Jacob Francis,	Philadelphia,	Pa.	James VanCourt.
Ott, Emile,	Philadelphia,	Pa.	Gustavus Krause.
Owens, Samuel,	Ashland,	Pa.	W. R. Owens, M.D.
Packer, George Harmon,	Beverly,	N. J.	H. C. VanMeter.
Paris, Edgar Price,	Philadelphia,	Pa.	D. Augustus Jones.
Parker, Frederick Henry,	Auburn,	N. Y.	John Butler.
Peat, Edward,	Delphos,	Ohio.	W. C. Bakes.

<i>Matriculants.</i>	<i>Town or County.</i>	<i>State.</i>	<i>Preceptor.</i>
Phillips, Jacob Franklin,	Ashland,	Pa.	P. M. Kelly, M.D.
Phillips, Thos. Jeff. Woodworth,	Deerfield,	N. J.	J. L. Bispham, Ph.G.
Pleibel, Fred. Wm., Jr.,	Philadelphia,	Pa.	Fred. Pleibel, M.D.
Podolski, Louis Adolph,	Philadelphia,	Pa.	George C. Evans.
Porterfield, Wm. Perry,	Falling Water,	W. V.	H. C. Blair's Sons.
Prall, Delbert Elwyn,	E. Saginaw,	Mich.	A. A. Dunk & Co.
Rapp, Fred.,	Mt. Carroll,	Ill.	M. J. Cummings.
Read, Harry Conrad,	Philadelphia,	Pa.	C. C. Hughes.
Reinecke, Ernest Wm.,	Pittsburg,	Pa.	Joseph W. Stenger.
Roe, Thomas Coombe,	Camden,	Del.	J. E. Lobstein, M.D.
Rosenwasser, Nathan,	Cleveland,	Ohio.	P. Fitch, M.D.
Rosenthal, Edwin,	Philadelphia,	Pa.	Gustavus Krause.
Ross, David Hambleton,	Philadelphia,	Pa.	Bullock & Crenshaw.
Ross, David William,	Philadelphia,	Pa.	James F. Koss.
Rudolph, John Mason,	Philadelphia,	Pa.	J. S. Ward.
Ryerson, Henry Ogden,	Newton,	N. J.	Samuel Campbell.
Sample, Geo. William,	York,	Pa.	C. R. Haig.
Scheehle, George Philip,	Wheeling,	W. V.	W. C. Bakes.
Schools, George William,	Lebanon,	Pa.	J. A. Armstrong.
Schwartz, Arthur,	St. Petersburg,	Russia.	J. J. Cummings, M.D.
Selinger, John Anthony,	Pottstown,	Pa.	John Oddy, M. D.
Shaler, Lewis Irwin,	Pottstown,	Pa.	L. M. Pratt, M. D.
Sharp, George Cutler,	Kansas City,	Mo.	A. M. Burden, M. D.
Shull, David Franklin,	Mansfield,	Ohio.	C. Shumury, Jr.
Smith Albert Henry,	Philadelphia,	Pa.	Herman A. Vogelbach.
Smith, Edward Newton,	Thompsonville,	Conn.	Alexander Campbell, M.D.
Smith, Frank Roop,	Wilmington,	Del.	N. B. Danforth, Ph.G.
Smith, Joseph Granville,	Lexington,	Ky.	Richardson & Simrall.
Smith, Joseph Stahle,	Warren,	Pa.	
Smith, Thomas,	Philadelphia,	Pa.	Robert Shoemaker & Co.
Smith, Wm. Harrold,	Philadelphia,	Pa.	Jos. P. Remington.
Sommer, Aldo,	Quincy,	Ill.	Sommer, Miller & Terdenge.
Sparks, Wm. Cassidy,	Camden,	N. J.	Emmor H. Lee.
Speaker, George,	Philadelphia,	Pa.	Wm. A. Whittem.
Spencer, William,	Carlisle,	Pa.	H. C. Blair's Sons.
Stearns, Moses,	Cincinnati,	Ohio.	
Stern, Oliver Henry,	Allentown,	Pa.	W. H. Rinker, Ph.G.
Steuben, Milton Richard,	Bethlehem,	Pa.	Henry A. Bower.
Stevenson, Richard Graham,	Camden,	N. J.	W. R. Warner & Co.
Stinson, Wm. James,	Philadelphia,	Pa.	Geo. D. Keefer & Bro.
Stone, Ward Beecher,	Orwell,	Ohio.	R. E. Stone & Co.
Strobel, John, Jr.,	Philadelphia,	Pa.	J. K. Knorr, M.D.
Suess, Paul John,	S. Bethlehem,	Pa.	John Shoffner.
Sweitzer, Morris Kemerer,	Bethlehem,	Pa.	S. E. R. Hassinger.
Terrill, George Morton,	Salem,	Va.	G. H. Landon & Co.
Thomas, Robert, Jr.,	Valdosta,	Ga.	R. Thomas, M.D.
Trimble, Frank Fremont,	Salem,	Ohio.	R. P. Trimble.
Trupp, Louis,	Philadelphia,	Pa.	J. Wendel, Jr.
Uhler, Harry Negley,	Philadelphia,	Pa.	H. N. Uhler, M.D.
Unangst, Eugene Peter,	Bethlehem,	Pa.	Unangst & Kressler.
Wade, McClanahan,	Christiansburg,	Va.	Hays & Co.
Walker, Henry Crawford,	Wilmington,	Del.	Smith & Painter.
Wallace, Wm. Sampson,	Newark,	Ohio.	Hugh Campbell.
Warner, Wm. R., Jr.,	Philadelphia,	Pa.	Wm. R. Warner.
Watermann, Benj. Carpenter,	Eugene,	Ind.	F. G. Irwin.
Weber, Jeremiah,	Philadelphia,	Pa.	M. Coombes.
Webster, George Caleb,	Concordville,	Pa.	Wm. Procter, Jr., Co.
Wehrli, Albert Christian,	Chicago,	Ill.	A. E. Ebert, Ph.G.
Weiss, Louis,	Del Norte,	Col.	P. R. Thombs.
Weller, Morris Sansom,	Quincy,	Ill.	Sommer, Lynds & Co.
Werkshagen, Otto,	Philadelphia,	Pa.	C. A. Werkshagen.
Wetherill, Wm. Henry,	Philadelphia,	Pa.	Wetherill & Bro.
Whitehill, George William,	Marietta,	Pa.	Harry N. Bryan.
Whiteside, Wm. Elder,	Philadelphia,	Pa.	P. S. P. Whitesides, M.D.
Whitney, Henry Clay,	Glassboro,	N. J.	G. Krause.
Williams, Luther Thomas,	Sudlersville,	Md.	R. M. Busted.
Williams, Thomas David,	Minersville,	Pa.	J. B. Moore.
Wilson, Alexander,	Philadelphia,	Pa.	John Moffet.
Wilson, Thos. Winifred,	Wilkesbarre,	Pa.	Thos. Hunter.
Winans, Henry Matthias,	Muncie,	Ind.	J. F. Nickey.
Wingert, Joseph Vincent,	Pottsville,	Pa.	F. C. Clemson.
Witsil, George Edward,	Beverly,	N. J.	Baker, Moore & Meis.
Wolf, Francis Xavier,	Reading,	Pa.	J. H. Stein.
Woolston, Wm. Norton Shinn,	Mt. Holly,	N. J.	A. W. Test.
Wright, G. Shoemaker Roberts,	Philadelphia,	Pa.	Richard Walmsley.
Zacharias, Isidore,	Savannah,	Ga.	Lippman Bros.
Ziebach, Edwin Robert,	Fremont,	Pa.	Dr. J. W. Douges.
Zinn, Oscar,	Milwaukee,	Wis.	Chr. Widule.